INFORMATION SYSTEMS ASSESSMENT: DEVELOPMENT OF A

COMPREHENSIVE FRAMEWORK AND CONTINGENCY

THEORY TO ASSESS THE EFFECTIVENESS OF THE

INFORMATION SYSTEMS FUNCTION

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The purpose of this research is to develop a comprehensive, IS assessment framework using existing IS assessment theory as a base and incorporating suggestions from other disciplines. To validate the framework and to begin the investigation of current IS assessment practice, a survey instrument was developed. A small group of subject matter experts evaluated and improved the instrument. The instrument was further evaluated using a small sample of IS representatives. Results of this research include a reexamination of the IS function measurement problem using new frameworks of analyses yielding (a) guidance for the IS manager or executive on which IS measures might best fit their organization, (b) a further verification of the important measures most widely used by IS executives, (c) a comprehensive, theoretically-derived, IS assessment framework, and by (d) the enhancement of IS assessment theory by incorporating ideas from actual practice. The body of knowledge gains a comprehensive, IS assessment framework that can be further tested for usefulness and applicability. Future research is recommended to substantiate and improve on these findings. Chapter 2 is a complete survey of prior research, subdivided by relevant literature divisions, such as organizational effectiveness, quality management, and IS assessment. Chapter 3 includes development of and support for the research questions, IS assessment framework, and the research model. Chapter 4 describes how the research was conducted. It includes a brief

justification for the research approach, a description of how the framework was
evaluated, a description of how the survey instrument was developed and evaluated, a
description of the participants and how they were selected, a synopsis of the data
collection procedures, a brief description of follow-up procedures, and a summary.
Chapter 5 presents the results of the research. Chapter 6 is a summary and conclusion of
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CHAPTER 1

INTRODUCTION

Information Systems (IS) managers are under increasing pressure to justify the value and contribution of IS to the productivity of the organization. IS assessment is not well established in the current literature, and the few, recent studies show that more research is needed (Beise, 1989; Brynjolfsson & Hitt, 1998; Chong, 2001; Clark, 1992; DeLone & McLean, 1992; Dickson, Wells, & Wilkes, 1988; Gottschalk, 2001; Myers, Kappelman, & Prybutok, 1997; Saunders & Jones, 1992). The purpose of this research is to develop a comprehensive, IS assessment framework using existing IS assessment theory as a base and incorporating theory from other disciplines. To validate the framework and to begin the investigation of current IS assessment practice, a survey instrument was developed. The instrument was evaluated and improved using a small group of subject matter experts. The instrument was further evaluated using a small sample of IS representatives. The larger goal of this study is the development of a theoretically based, comprehensive, IS assessment system derived from current practice. Such an assessment system will provide real benefits to the quality and productivity of organizations.

Importance of Topic

Frequently, information technology is used without a full understanding of its applicability, effectiveness, or efficacy. IS managers often lack the tools they need to decide if they are accomplishing the right activities (Davis & Hamann, 1988; Gottschalk,

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2001). In addition, these managers often fail to learn if they are meeting the needs of their customers. "While much has been written concerning information systems productivity, defining and measuring it has proved to be difficult" (Scudder & Kucic, 1991). "Companies have come to realize they are paying big money for technology that isn't being used" (King, 1991). Furthermore, Maglitta's (1993) survey of senior executives from 220 Fortune 1000 firms found extremely low satisfaction with returns on corporate technology investments. Over 81 percent of those polled rated their organization's payback on technology spending as minimal or average.

No single measure of the value of the IS function has appeared (W. Carlson & B. McNurlin, 1992). 'Measuring IS effectiveness' is consistently reported in the top 20 on the list of most important IS issues by the members of the Society for Information Management (SIM), an organization of IS executives (see Ball & Harris, 1982; Brancheau & Wetherbe, 1987; also see Caudle, Gorr, & Newcomer, 1991; Dickson, Leitheiser, Nechis, & Wetherbe, 1984; Niederman, Brancheau, & Wetherbe, 1991). While evidence in some recent studies suggests that the productivity paradox may no longer exist (Brynjolfsson & Hitt, 1996; Brynjolfsson & Hitt, 1998; Stiroh, 2001), the issue "measuring benefits from information technology" still appeared as number 11 of 24 key issues in a recent ranking by IT managers (Gottschalk, 2001).

In fact, effectiveness of the IS function has proven practically impossible to define and measure (Niederman et al., 1991). Many possible explanations for this difficulty are available. For example, the role of the IS function in business performance can be subtle and difficult to differentiate from other factors (Crowston & Treacy, 1986; Niederman et al., 1991). Some companies use weak 'surrogate' measures of IS

effectiveness that hide the true value of the IS function (Niederman et al., 1991). Others

depend mostly on qualitative rather than quantitative measures (Hartog & Herbert, 1986;

Marion, 1992; McLean, Kappelman, & Thompson, 1993). Berndt & Morrison (1991)

believe that the lack of evidence of a payoff for the high investment in technology could

be interpreted as reflecting serious measurement deficiencies (also, Baatz, 1994;

Brynjolfsson, 1993).

Evidence suggests that poor performance of the IS function is a serious inhibitor

to good business performance (W. Carlson & B. McNurlin, 1992). Carlson and McNurlin

(1992) also found evidence in several of the organizations they studied that high IS

effectiveness is associated with high organizational performance. Others report a clear

connection between assessment and productivity (Tayntor, 1994).

Assessment is an essential requirement of a feedback loop for continuous

improvement of the IS function and such improvement relates directly to the overall

performance of the organization as measured by effectiveness. "Just as a human being

needs a diversity of measures to assess his or her health and performance, an organization

needs a diversity of measures to assess its health and performance" (Drucker, 1989, p.

230). Systematic measurements are needed to guide action. Without these, managers

must depend on their experience and judgment. While experience and judgment will

always be important, as firms become more complex and move into global markets,

relying on intuition alone is increasingly more (Singleton, McLean, & Altman, 1988).

Managers define what is important to the organization and manifest corporate

culture in their assessment choices (Eccles, 1991; Strassman, 1990; Tsui, 1994). "What

gets measured gets attention" (Eccles, 1991, p. 131). It is clear that IS assessment is vital

to the organization. Also, organizations need a comprehensive framework for assessment to aid them in developing IS assessment systems. How should organizations assess the IS function? What are IS managers assessing today and how are they accomplishing it?

<div align="center">Limitations and Key Assumptions</div>

Personalities and communication styles of the CEO and the IS manager are acknowledged as important variables that may have an effect on the study variables (Tsui, 1994), but are beyond the scope of this research and will not be considered. Key assumptions follow:

1. Better use of information, both internal and external, relates positively to profitability (Strassman, 1990).

2. Efficiency and effectiveness are different and require different measures. An efficient IS function is not necessarily an effective one. Efficiency focuses on internal requirements of the IS function, while effectiveness requires an external focus. An example of an IS function efficiency measure is the number of tasks completed per unit of time. An effective IS function, for example, is concerned about the impact of the information provided in helping users do their jobs. Efficiency is concerned with doing things right; effectiveness is concerned with doing the right things (McLean, 1973).

3. The management of quality is not sufficient to ensure the effectiveness of the IS function. "The ISO 9000 series of standards is a model for the management of a quality assurance system designed to ensure that at a *minimum*, a series of steps are taken to ensure that you do indeed satisfy your customer requirements" (Lamprecht, 1992, p. 49). "Quality systems, not products, are registered. This is an important distinction. The assumption is if quality systems exist, internal processes are controlled. A further

assumption is if they are controlled, they are capable and are improving. Finally, the products from these processes conform to customer requirements. This may well be a stretch. *Having registered quality systems can be far removed from guaranteeing product quality or satisfying customers*" (Hutchins, 1993, pp. 208-209).

4. Information systems are developed and services are provided by the IS function to support the activities and tasks of the individuals and groups (units, departments, etc.) within the organization in the pursuit of the mission, goals, and objectives of the organization. The purpose of the IS function is to improve the performance of the individuals and groups which is, in turn, intended to have a positive effect on the internal and external performance of the organization. Organizations in which the IS function has become a line function, that is, where information systems are products of the organization, are excluded from this study.

5. Organizations may have a single IS department that serves the entire organization (centralized) or there may be pockets of IS activity in multiple departments (decentralized or distributed). In either case, it is assumed that the organization will have one individual responsible for the management of the information assets of the organization. This individual may have the title chief information officer (CIO), or the responsibility may be assigned to some other executive, such as the chief financial officer (CFO). Either IS manager or IS executive may be used to refer to this individual.

Contributions to Knowledge

Some potential results of this research include a reexamination of the IS function measurement problem using frameworks of analyses contributed by DeLone and McLean (1992), Saunders and Jones (1992), and Cameron (1986), yielding (a) guidance for the IS

manager or executive on which IS measures might best fit their organization, (b) a further verification of the important measures most widely used by IS executives, (c) a comprehensive, theoretically-derived, IS assessment framework, and by (d) the enhancement of IS assessment theory by incorporating ideas from actual practice.

The body of knowledge will gain a comprehensive, IS assessment framework that can be further tested for usefulness and applicability. Future research will be recommended to substantiate and improve on these findings. Also, the organizations sampled will inevitably not have highly valued measures in all areas of the framework. Therefore, new research will be proposed to further test the framework.

Organization of the Dissertation

The remainder of the dissertation is organized as follows.

Chapter 2 is an extensive survey of prior research, subdivided by relevant literature divisions, such as organizational effectiveness, quality management, and IS assessment. It provides the background to the research by describing what has been done and document why this research is unique by showing the work that has not been covered by prior research.

Chapter 3 includes development of and support for the research questions, IS assessment framework, and the research model (including the variable relationships).

Chapter 4 describes how the research was conducted. It includes a brief justification for the research approach, a description of how the framework was evaluated, a description of how the survey instrument was developed and evaluated, a description of the participants and how they were selected, a synopsis of the data collection procedures, a brief description of follow-up procedures, and a summary.

Chapter 5 presents the results of the research. An introduction leads into a summary of the demographic information for the participants, followed by a description of the analysis methods used. The results are reported in both tabular and textual forms.

Chapter 6 is a summary and conclusion of the research. The dissertation is summarized with emphasis upon the results obtained and the contributions made by these results. The limitations of the conclusions are described and suggestions for future research are outlined.

Finally, included in the appendices are definitions of terms, and copies of the original and improved survey instruments.

CHAPTER 2

LITERATURE REVIEW

Introduction

Lord Kelvin, in the 1890s, described the value of measurement when he made the

following comments:

> When you can measure what you are speaking about, and express it in numbers,
>
> you know something about it; but when you cannot measure it, when you cannot
>
> express it in numbers, your knowledge is of a meager and unsatisfactory kind: it
>
> may be the beginning of knowledge, but you have scarcely, in your thoughts,
>
> advanced to the stage of science (as quoted in Bohn, 1994, p. 72).

As will be shown, IS assessment is not well established in the literature. Even though

progress is slow, many steps toward a comprehensive framework for the assessment of

the IS function have been taken. A review of the relevant literature will begin with a brief

summary of the early work in assessment of the IS function. The early work summary is

followed by a presentation of the methods and procedures suggested by the literature for

developing assessment systems and some of the problems encountered. Two areas that

offer significant contributions to organizational assessment theory, organizational

effectiveness and quality management, are examined next. Several recent studies make

pivotal contributions to the development of an assessment framework of the IS function

and are reviewed last, followed by the conclusion of the literature review.

Early Work

Articles discussing the need to assess the contribution of the IS function to the

organization began appearing in the late 1970s (King & Rodriguez, 1978; Matlin, 1977;

Rolefson, 1978). Early research into assessing the value of the IS function concentrated

on economic considerations and introduced the idea that multiple assessment measures

were essential to develop a clear picture (Ahituv, 1980; Bender, 1986; King & Schrems,

1978; Matlin, 1979). Most early attempts at assessing the IS function centered on

measures of system availability and performance. For example, Borovits and Neumann

(1979) described several indices of performance: capacity, response time, throughput

rate, overhead percentage, software time measures, reliability measures, system

utilization measures, raw speed, and availability. Many in-depth procedures for system

evaluation were presented (see also, Ein-Dor & Jones, 1985). McLean (1973) was one of

the first to call for a shift from a measurement focus on efficiency to effectiveness; in

other words, doing the right thing rather than doing the thing right. To do this would

require computer professionals to measure and pursue organizational objectives, rather

than pursue their individual goals. Zmud (1979) analyzed the empirical literature

regarding the influence of individual differences upon IS success and found a clear

indication that individual differences do exert a major force in determining IS success.

Lucas (1972) introduced the idea of including users when assessing the IS function.

Others began evaluating various measures of system effectiveness and considering the

different viewpoints of the evaluators (Hamilton & Chervany, 1981a, 1981b).

In his book, <u>Managing Organizational Performance</u>, Nash (1983) asserted that

profit, size and growth were the primary measures of performance for organizations. Size

and growth can be measured at several levels: number of employees, value added, number of markets, and the level Nash considered the most appropriate, revenue. These quantitative measures are often used for IS organizations since they are easy to calculate and easy to use for comparisons with other companies' IS departments. But, they only show part of the total contribution of the IS function and it is not clear that they even do that well. Is a growing IS function necessarily a good one? Not if it is consuming an increasing percentage of the corporation's expenses and not returning value (Moad, 1993).

Assessment Methods & Procedures

Considerable literature exists that proposes methods and offers recommendations for developing assessment systems. The literature asserts that in developing measures, the first and most important point emphasized is to align all measures of effectiveness with corporate objectives (Thierauf, 1988). This should follow easily once the IS function is aligned with the strategic direction of the corporation (Mendelow, 1983). The goal is to couple vision with performance (Cross & Lynch, 1992) to aid the IS function in staying aligned with the corporation in a very complex, ever-changing environment.

Many authors (AT&T Quality Steering Committee, 1990a, 1990b; Blenkinsop & Burns, 1992; Eccles, 1991; Lefrancois, 1984) stress that measures should be easy to implement and understand. For example, Lefrancois (1984) said any evaluation system should have a basis of measurement that is "readily understood, simple to implement, easy to administer, and clearly cost effective" (p. 58). The AT&T Quality Steering Committee (1990b) suggested the following criteria for effectiveness measures:

- Derived from customer requirements

- Practical to implement

- Easy to understand

- Able to drive desired behavior

- Agreed to by the work groups involved. (p. 42)

The IS function is in the business of serving customers.

> Customers buy your service based on the value or benefit it provides. Creating
> value for customers requires a thorough understanding of their requirements and
> expectations, and the ability to translate this understanding into concrete service
> objectives to drive business activities. Management of processes offers a
> systematic approach to establishing and maintaining the connection between
> customer expectations and improvement activities. (AT&T Quality Steering
> Committee, 1990a, p. 4)

Others discuss the need to balance internal, cost-based measures with process and
product measures when developing an assessment system (Anonymous, 1993; Band,
1990; Thornburg, 1991). LaPlante and Alter (1994) addressed the need to use measures
that embody senior general managers' definition of value and to make continual surveys
of end-users an integral part of the way the IS function is managed. Gatian (1994) tested
the question 'Is user satisfaction a valid measure of IS effectiveness?' and found support
for the relationship. While it is important to know that this relationship exists, user
satisfaction is just one measure of the effectiveness of the IS function and assessing it
alone is not sufficient to determine the overall effectiveness of the IS function. Ensuring
that each measure is appropriate for, or 'fits' the organization is discussed by many writers
(e.g., Cameron, 1978, 1980; Goodman & Pennings, 1977; Scott, 1977; Singleton et al.,

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1988) and will be presented in more detail in the section on organizational effectiveness that follows a summary of assessment problems.

Assessment Problems

Rice (1987) discussed the problems with using various criteria when assessing a specific application of IS: computer-mediated communication. Economic criteria are particularly troublesome when applied to information work. Traditional economic measures include cost and revenue. But as Rice described, information can be shared simultaneously by multiple users and created and enhanced without clear methods of assigning cost or benefits. Also, managers that rely on cost/benefit measures typically fail to consider the cost of training or more importantly, the lost opportunity for revenue generation when training is not provided.

Technical criteria of evaluation are usually based on rate of transmission or the cost per unit of transmission. Rice (1987) described three biases created by using such measures. First, more is not always better. Second, looking only at the information transmitted assumes that it can be objectively separated from the participants in the communication process, which ignores the role the participants have in creating meaning and the effect of the relationships among the participants. The third false bias created by using only technical criteria for evaluation is an assumption that the organization is an efficient, rational system with common goals, feeding only on the distribution of information. That assumption may not be valid in most organizations.

Ryan (1991) reported on his round-table discussions with IS executives from the banking industry on the topic of how they assess the contribution of the IS function to the performance of the organization. Some ways cited include: determine the impact of IS on

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other departments ranging from subjective evaluations to charge-back reviews; conduct

post-implementation reviews to see if promises of IS projects meet expectations; analyze

report cards from user departments; service quality; competitiveness; and user department

involvement. Many executives questioned the feasibility of assessing the value of IS on

the bottom line in banking since it is so ingrained in their business (see also Crowston &

Treacy, 1986). It would be like trying to measure the value of an accounting department

or a personnel department. But attempts to measure the value of IS are still made using

the above-mentioned criteria.

<div align="center">Organizational Effectiveness</div>

Extensive work has been done in attempting to define and measure organizational

effectiveness. Steers (1975) reviewed the organizational effectiveness literature and noted

a distinction between univariate and multivariate performance measures. He made a

comparison of seventeen multivariate models in the literature and found a lack of

consensus about what constitutes a useful and valid set of effectiveness measures and

very little overlap across the various approaches (see also, Campbell, 1977; Goodman &

Pennings, 1977). Cameron and Whetten (1983) asserted that no single, universal model

of effectiveness is possible. Based on his analysis, Steers (1975) identified eight general

problems in assessing organizational effectiveness: (1) Construct validity; (2) criterion

stability; (3) time perspective; (4) generalizability; (5) theoretical relevance; (6) multiple

criteria; (7) precision of measurement; and (8) level of analysis. Since effectiveness is

often so hard to define and measure, Cameron (1984) suggested a model of

organizational ineffectiveness. Its basic assumption is that it is easier, more accurate,

more consensual, and more beneficial for organizations to identify ineffectiveness

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(problems or faults) than it is to identify criteria of effectiveness (competencies). An

organization is viewed as having achieved effectiveness when it is free from

characteristics of ineffectiveness.

Table 1 - Models of Organizational Effectiveness (Cameron, 1984, p. 276)

Model	Definition	When Useful
	An organization is effective to the extent that . . .	The model is preferred when . . .
Goal Model	it accomplishes its stated goals.	goals are clear, time-bound, and measurable.
System-Resource Model	it acquires needed resources.	a clear connection exists between inputs and outputs.
Internal Process Model	it has an absence of internal strain, with smooth internal functioning.	a clear connection exists between organizational processes and the primary task.
Strategic-Constituencies Model	all strategic constituencies are at least minimally satisfied.	constituencies have powerful influence on the organization (as in times of little organizational slack), and it must respond to demands.
Competing Values Model	the emphasis of the organization in four major areas matches constituent preferences.	the organization is unclear about its own emphases, or changes in criteria over time are of interest.
Legitimacy Model	it survives as a result of engaging in legitimate activities.	the survival or decline and demise among organizations must be assessed.
Ineffectiveness Model	there is no absence of characteristics of ineffectiveness.	criteria of effectiveness are unclear, or strategies for organizational improvement are needed.

Cameron (1984) also presented a tabular comparison among major models of

organizational effectiveness, giving definitions for each model and describing the

conditions under which each is the most useful (also Lewin & Minton, 1986). The seven

models described by Cameron (1984) are shown in Table 1. In addition to the tabular

comparison of the models, Cameron briefly describes each model in a separate paragraph, noting the origin, usefulness, and unique characteristics of each model of effectiveness. Different models of effectiveness are useful in different circumstances and it is important to consider the fit of the model to the organization being measured (also Lewin & Minton, 1986; Melone, 1990). Cameron (1980) suggested 6 critical questions that must be considered in assessing effectiveness, subsequently expanded to 7 questions by Cameron (1984) and 7 guidelines for assessing organizational effectiveness by Cameron and Whetton (1983). These 7 guidelines are listed below:

Guide 1: From whose perspective is effectiveness being judged?

It is important to make explicit who is defining and assessing effectiveness, since each constituency will use different criteria.

Guide 2: On what domain of activity is the judgment focused?

The customer, process, and output/service define the domain being judged and it's important that this be explicitly stated, since many different domains exist in organizations and each one should be judged differently.

Guide 3: What level of analysis is being used?

Effectiveness judgments can be made at many levels: individual, subunit, organizational, industry, societal. The appropriateness of the level depends on the constituency being used, the domain being focused on, the purpose of the evaluation, etc.

Guide 4: What is the purpose for judging effectiveness?

The judgment almost always is affected by the purpose(s). Different data will be available, different sources will be appropriate, different amounts

of cooperation or resistance will be encountered, different strategies will

be necessary based on differences in purpose. The purposes also help

determine appropriate constituencies, domains, levels of analysis, etc.

Guide 5: What time frame is being employed?

Long-term effectiveness may be incompatible with short-term

effectiveness, and sometimes effects and outcomes cannot be detected

using the wrong time frame, since they may occur suddenly in the short

term, or incrementally over the long term. The time frame should be made

explicit.

Guide 6: What types of data are being used for judgments of effectiveness?

Objective data or subjective, perceptual data? Objective data will tend to

be more reliable, more easily quantifiable, and more representative of the

'official' position. These also limit the scope and usefulness of the data.

Subjective data allows assessment of a broader set of criteria, but can be

biased, and lack validity and reliability.

Guide 7: What is the referent against which effectiveness is judged?

Comparing competitors, comparing to a standard, comparing to the

organizational goals, comparing to past performance, or evaluating on the

basis of characteristics the organization possesses are all possible methods

for comparison. Each one will yield different effectiveness judgments;

therefore, the referent being used should be made clear.

Carefully considering these guidelines "should help clarify the meaning of organizational effectiveness in each type of evaluation and guide evaluators in the selection of appropriate criteria" (Cameron, 1980, p. 79).

Cummings (1977) described a different problem: "Effectiveness may be seen by many successful managers (those who somehow get to the top of their organizations and make the most money within their organizations) as best defined *in process*. The object is to end up being good at what is measured" (p. 58). Likert (1967) also discusses this problem. Being able to collect accurate measurements in an organization depends on how the results are used over time. All levels of the hierarchy fear punitive use of measurements, except at the very top, and to protect themselves, employees will do whatever is necessary, especially with end-results measurements, to force the data to look favorable to them.

Anthony (1965) identified three levels or aspects of management that occur in all organizations: operational, managerial, and strategic. At each level, different measures are appropriate. At the operational level, efficiency and productivity are the key. At the managerial level, the effectiveness of the organization and management becomes essential. Finally, at the strategic level, the competitiveness of the enterprise itself is of central concern. Van de Ven and Ferry (1980) advocated another view of organizational effectiveness that highlights the question of from whose perspective effectiveness is defined.

Campbell (1977) provided an extensive list of criterion measures or variables proposed in the literature as indices of organizational effectiveness (see Table 2).

Table 2 - Indices of Organizational Effectiveness (Campbell, 1977, pp. 36-39)

1. Overall Effectiveness (general evaluation by knowledgeable judge)	13. Control
	14. Conflict/Cohesion
	15. Flexibility/Adaptation (Adaptation/Innovation)
2. Productivity (can be measured at individual, group, and total organization via records or ratings or both)	16. Planning and Goal Setting
	17. Goal Consensus
	18. Internalization of Organizational Goals
3. Efficiency	19. Role and Norm Congruence
4. Profit (return on inventory (ROI) or return on sales (ROS) are sometimes used as alternative definitions)	20. Managerial Interpersonal Skills
	21. Managerial Task Skills
	22. Information Management and Communication
5. Quality	23. Readiness (military)
6. Accidents	24. Utilization of Environment
7. Growth	25. Evaluations by External Entities
8. Absenteeism	26. Stability
9. Turnover	27. Value of Human Resources
10. Job Satisfaction	28. Participation and Shared Influence
11. Motivation	29. Training and Development Emphasis
12. Morale	30. Achievement Emphasis

He emphasized the need for organizations, as well as researchers, to adopt a theory or model of effectiveness. They must also know the mission of the organization and the organizational objectives for each process or task. These requirements must be met before measures of goal attainment are developed. "If a systematic analysis of task objectives can be made, the measurement problems will be substantially solved" (p. 49).

Cameron and Quinn (1988) presented the various paradoxical situations that exist in successful organizations. A paradox happens when two mutually exclusive, seemingly incompatible situations exist side-by-side. When measuring performance, they stressed the need to include measures of effectiveness and ineffectiveness to account for paradox. For example, consider defining the condition of excellent physical health or wellness. Some indicators might include low percentage of body fat, low blood pressure, cardiovascular fitness, etc. High scores on these indicators might suggest wellness, but

low scores do not necessarily mean illness. Independent criteria are needed to indicate illness, such as bleeding, nausea, fever, etc. Illness and wellness could exist simultaneously in the same person. The same is true for the IS function; it could be both effective and ineffective simultaneously. Therefore, both conditions should be accounted for in an assessment system.

The point Quinn and Cameron (1988) emphasized about paradox is the importance for organizations to balance the opposing sides of paradox; to not go too far one way or the other. Paradox is good and aids in organizational effectiveness, but unbalanced paradoxical situations will yield an ineffective organization. A balanced organization has the potential to increase productivity, goal clarity, stability, participation, commitment, morale, innovation, growth, and so on, while taking any of these positive characteristics to the extreme can cause a negative situation. For example, stability and control may turn into habitual perpetuation and ironbound tradition; or innovation and change become premature responsiveness and disastrous experimentation; and a well-ordered hierarchy might become a frozen bureaucracy. "In each case, by pursuing good through too narrow a frame, unintended negative consequences are created" (p. 306). They said that it is difficult to perform this balancing act and that only a few will develop mastery, and only then through painful experience (see also K. S. Cameron, 1986; Meyer & Gupta, 1994; Miller, 1992, 1993).

As discussed in this review, the assessment of organizational effectiveness is a difficult task. Yet, using the excellent suggestions of the research presented, organizational effectiveness can be defined and assessment systems developed. From assessment guidelines (Cameron & Whetten, 1983) to extensive lists of possible

measures of effectiveness (Campbell, 1977), the organizational effectiveness literature provides substantial support for the establishment of assessment systems of organizational effectiveness.

Quality Management

The quality management field is another field that offers extensive advice for the assessment of organizations. Fleit (1992) asserted that:

> We have to learn that excellence in information technology comes from one thing only: customer satisfaction; not from the number of MIPS in the computer center, not from the speed of the campus network, and not from the number of lines per day the programmers code. (p. 81)

This opinion is echoed repeatedly in the literature (see Asbrand, 1993; AT&T Quality Steering Committee, 1990a; Davis, 1991; Doll & Ahmed, 1985; Hamilton & Chervany, 1981a; Marcolin & Higgins, 1992; Reichheld & Sasser, 1990; Stearns, 1984; Strassman, 1985). "Quality measures represent the most positive step taken to date in broadening the basis of business performance measurement" (Eccles, 1991). Improving the methods of measurement of customer satisfaction has been addressed by both the quality literature (e.g., Feigenbaum, 1983; Garvin, 1988; National Institute of Standards and Technology, 1995; Ross, 1993) and the IS literature (e.g., Bailey & Pearson, 1983; Carey, 1993; Gatian, 1994; Hamilton & Chervany, 1981b; Ives, Olson, & Baroudi, 1983; Raymond, 1987).

The *Malcolm Baldridge National Quality Award: 1995 award criteria* (National Institute of Standards and Technology, 1995) (MBNQA) offers a complete set of criteria to be used in developing a quality management system, including leadership, information

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and analysis, strategic planning, human resource development and management, process management, business results, and customer focus and satisfaction. While these criteria are not specific to the IS function, an organization that prepares itself to compete for the award will likely be well on its way to adequately assessing all areas of the business, including the IS function. In discussing the quality measurement systems of previous Baldridge Award winners, Curt Reimann, the director of the Baldridge program, said: "The winning companies measure all their processes. Companies that aren't doing as well have limited measurements and limited access to comparative measurements" (Lakewood Publications, 1990, p. 4). Some have used the MBNQA criteria as the basis for developing self-assessment surveys of their IS systems (Prybutok & Spink, 1999). Another researcher integrated the MBNQA with the IS assessment framework (Myers et al., 1997) to suggest a new framework for IS assessment, IS-MBNQA (Chong, 2001). The MBNQA criteria provide an excellent example of an organization-wide, assessment system, but it alone lacks adequate guidance for the development of a comprehensive, IS assessment system.

Another area of quality research, service quality, views organizations as a collection of multiple processes with the goal of providing the customer with a high-quality service. Service quality is applicable to the IS function, since IS could be considered a service function that serves the information technology needs of the larger organization. Considerable help is available for the IS manager in knowing how to measure and improve service quality. Parasuraman, Zeithaml, & Berry (1985) listed the "Determinants of Service Quality" as reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding/knowing the customer, and

tangibles. They developed these further and gave examples of survey questions to ask to measure levels of each determinant in their book: <u>Delivering Quality Service</u> (Zeithaml, Parasuraman, & Berry, 1990). Babbar (1992) extended the service quality model to include system hardware and networking requirements and the dynamics of system operation and control. Landrum (2001) found that library service quality is an important factor in library success and that measuring it required a combination of SERVQUAL and library success instruments.

Nath (1992) used the work of Parasuraman et al. (1985) to develop a framework to improve service quality. His framework involves the examination of the interfaces between the customer, the employee, and the existing IS applications to detect where applications of information technology will alter the interfaces in a positive way either for the customer or the organization. The effect of the change on the customer should be evaluated in terms of how it influences the ten determinants of service quality listed above. Funston (1992) developed a service quality model and depicted gaps in service quality, communication, delivery, and design where measurement and improvement are possible. Performance evaluation should be linked to service quality at all levels and the customer should be built into these evaluations. Considering the IS function as a service and applying the principles of service quality will yield many opportunities to measure and to show the value of the IS function to the organization (Remenyi & Money, 1994). While service quality measures are important for assessing the IS function, using them alone in an assessment system will not provide a thorough understanding of the total contribution of the IS function to the organization.

Moore (1992) recommended viewing the organization as a system and developing process interface diagrams. These can be a "tool for communicating, eliminating barriers, understanding the relationships within the organization, planning, measuring processes, and responding to suggestions for improvement from customers, suppliers, and employees" (p. 1). He related the importance of goals to effective measurement when they are continually monitored against organizational objectives, customers' needs, and benchmarking information.

Others also recommend organizational process modeling to aid in measurement and improvement (see AT&T Quality Steering Committee, 1991; Davis, 1991; Donnell & Dellinger, 1990; Hamilton & Chervany, 1981b; Pengelly, Norris, & Higham, 1993). Hodgetts (1993) described the benefits that winners of the Baldridge National Quality Award report from their emphasis on incremental improvements via ongoing, quality measurements. The benefits reported include increased quality of output, greater competitiveness, and higher profitability. Relative perceived quality and profitability are strongly related and quality is also related to growth (Buzzell & Gale, 1987).

Another value in developing organizational process diagrams is the ability to benchmark parts of the process against other similar organizations (see Buckler, 1994; Camp, 1989; Freedman, 1992; McReynolds & Fern, 1992; Moad, 1994; National Institute of Standards and Technology, 1995). "Benchmarking involves identifying competitors and/or companies in other industries that exemplify best practice in some activity, function, or process and then comparing one's own performance to theirs" (Eccles, 1991). The information gained from comparing oneself to others is invaluable in a measurement and improvement program. It can show areas where much improvement

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is needed and where the organization compares quite favorably. Benchmarking is a useful tool to include in a measurement program.

Mayer (1991) gave several cases of hospitals employing quality management to improve analysis of effectiveness. Kaiser Permanente's quality agenda commits them to "measuring quality by determining how effective its clinical treatment is for each patient; how satisfied it makes customers, payers, members, patients and staff; how efficiently the company functions at all levels; and how appropriately it uses resources to improve the health of its members" (p. 512). Recommended measures include customer surveys, managed-care contract levels, employee turnover rates, patient outcome indicators, and real dollars. Mayer emphasized the need to use multiple measures, including customer satisfaction and efficiency measures at multiple levels, and to match measures to the strategic goals of the organization. Once again the need for an assessment system incorporating multiple measures of various levels or dimensions of the organization and tied to the strategic goals of the organization is presented.

Thompson and Cannon (1978) described hospital quality management measures as existing on two levels: the measurement of output as services in terms of the amount of resources used to produce the service; and the measurement of the cost of resources used to produce the service. These measures serve to relate price and efficiency. The most important point presented by the authors is the necessity of establishing standards for all units of measure. Benchmarking is one way of setting these standards.

In summary, consider the following: In a recent IS satisfaction survey of users conducted by *Datamation* (Meachim, 1994), users reported their top three reasons for choosing a vendor were: quality/reliability of product, product performance, and quality

of service/support. They also found that the companies rated the highest by users were also the most profitable. But, quality does not improve unless you measure it (Reichheld & Sasser, 1990; Seymour, 1992). In IS organizations where total quality management (TQM) has been successfully implemented, the TQM methodology has served to cut costs, better align the IS function with the organization, ease the transition to change, and strengthen the IS function's service and reputation (Anonymous, 1993). The IS manager needs to install measurement systems that fairly and accurately assess the IS operation from the users' perspectives (Anonymous, 1993) and that include multiple measures of the multiple dimensions of the IS function that link to the overall goals of the organization.

<p style="text-align:center">Development of IS Assessment Framework</p>

While many steps toward the development of an IS assessment framework have been taken, the journey is still in progress. Several of the most recent frameworks are summarized here and presented in more detail in Chapter 3. In discussing how upper management wants to measure the IS function by its contribution to the business, Moad (1993) presented a framework for evaluating the IS function, developed by the Ernst & Young Center for Information Technology and Strategy. This framework is a 3 by 3 matrix of 9 different categories of performance of the IS function. One axis is the source of the IS function's performance, namely, individual, workgroup, and business unit. The other axis describes the area of company impact, that is, technology-enabling impact, organizational process outcome, and economic performance. No assistance is offered in developing measurement criteria or in suggesting useful measures for each category. Others have also developed IS assessment frameworks (Beise, 1989; Dickson et al.,

1988; Wells, 1987). But the two assessment frameworks that follow are the most recent and the most comprehensive.

In an exhaustive survey of the IS literature on IS effectiveness, DeLone and McLean (1992) cited that "MIS academic researchers have tended to avoid performance measures (except in laboratory studies) because of the difficulty of isolating the effect of the I/S effort from other effects which influence organizational performance" (p. 74). They organized the diverse research in IS success into a comprehensive taxonomy consisting of six major dimensions or categories: *system quality, information quality, use, user satisfaction, individual impact,* and *organizational impact*. These categories are interrelated and interdependent and DeLone and McLean suggested that they form an IS function success model (described in Chapter 3 and in Figure 1). DeLone and McLean's IS success model is the most comprehensive IS assessment model offered by IS research thus far. Yet this model has not been tested and as described below, they emphasize that additional research is required to authenticate the model's validity.

DeLone and McLean (1992) also suggested that arbitrarily selecting measures from each of the six dimensions of IS success to form an overall IS success instrument is not recommended. Instead, further research should be conducted by systematically combining individual measures from the IS success dimensions to develop a comprehensive measurement instrument, while considering contingency variables, such as the independent variables being researched; the organizational strategy, structure, size, and environment of the study organization; the technology; and the task and individual characteristics of the system being studied. "It is unlikely that any single, overarching measure of I/S success will emerge; and so multiple measures will be necessary, at least

in the foreseeable future" (p. 83). Other researchers agree (see K. Cameron, 1986; W. Carlson & B. McNurlin, 1992; Landen & Landen, 1990; Mahoney & Weitzel, 1970; Rockart & Short, 1989; Saunders & Jones, 1992; Scudder & Kucic, 1991; Zemke & Schaaf, 1990).

Saunders and Jones (1992) conducted a Delphi study that examined how IS function performance dimensions were ranked in importance by IS executives, how the IS executives measured performance in each dimension, and the value they placed on the measures. The authors also interviewed several chief executive officers (CEO) of the study organizations to find out the degree of their awareness of and support for IS function activities and to detect the level of agreement between CEOs and CIOs on the manner in which the IS function is assessed. The highest-ranked dimension was the IS function impact on strategic direction, followed by the integration of the IS function planning with corporate planning, the quality of information outputs, and the IS function's contribution to organizational financial performance. The measures used in the highest-ranked dimensions tended to be weak, surrogate measures and were not as highly valued as the more direct measures of the operational efficiency of the IS function, such as system response time and system availability. The authors suggested that one reason for this contradiction might be the fact that IS operational efficiency has been stressed for years while IS impact on strategic direction is a fairly new dimension and measures are still being developed. They also propose that "as the IS function matures, measures likely change from a structured focus on operational efficiency and user satisfaction to a more unstructured concern for IS impact on strategic direction" (p. 80).

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The IS function performance evaluation model (see Figure 2) offered by Saunders and Jones (1992) provides additional knowledge to the developing theory for IS assessment. By comparing the IS assessment perspectives of the CEO with the CIO, they provide a unique perspective for IS assessment, previously suggested by Cameron (1986) and others (Hamilton & Chervany, 1981b; Van de Ven & Ferry, 1980; Wilkes, 1987). They also contribute to a better understanding of the important IS success dimensions, the need to balance measures across dimensions, and the need to consider the maturity level of the IS function in an IS assessment model.

Yet their model cannot be considered a comprehensive, IS assessment model for several reasons. Their study sample was relatively small and was taken from firms in only three, selected cities in Texas, which leads us to question the generalizability of their results. No consideration is given to the interdependent, process nature of the performance of the IS function (DeLone & McLean, 1992) or to the suggested frequency of assessment. They also provide a very limited and inadequate list of suggested measures for each dimension. Even though the contribution to IS assessment theory by Saunders and Jones (1992) is significant, extension and further improvement is still required to provide the comprehensive model for IS assessment demanded by organizations today.

Conclusion

Grover and Sabherwal (1989) discuss an interesting problem they discovered in past IS research. Previously, "IS research has focused on narrow, technical issues that are probably easier to research" (p. 243). They assert that most IS doctoral programs stress technology and narrowness and that universities commonly emphasize quantitative and

structured studies of smaller problems rather than investigations of complex problems. The challenge, they say, is to make IS research more relevant and useful to practicing managers.

Information technology investment is related to organizational strategic and economic performance (Mahmood & Mann, 1993; Shaffner, 1994) and information technology has enhanced performance substantially (LaPlante, 1994; Maglitta, 1994; Metheny, 1994; James Brian Quinn & Martin N. Baily, 1994), yet the ability to measure this contribution to the productivity of the organization is still lacking (Anonymous, 1994; Betts, 1993; Brynjolfsson, 1994; Buckholtz, 1993; Krohe, 1993; James Brian Quinn & Martin Neil Baily, 1994; Ray, Harris, & Dye, 1994). As has been shown, the measurement of the effectiveness of the IS function is difficult and not obvious. An IS assessment system requires multiple measures of multiple dimensions of the IS function, based on the strategic goals of the corporation and based on both internal and external customer requirements, measures that are easily implemented and understood, and measures developed with the participation of everyone involved.

Considerable advice is available in the form of lists of potential measures or possible measurement dimensions, but very little research is available to explain which measures are appropriate for the various organizational characteristics or for different industries, or for the appropriate assessment frequency and quantity of measures. What are the appropriate areas to include in an IS assessment and what should be measured? How many measures are needed and how frequently should the assessment occur? There is also scant research on actual practice. What are IS managers assessing and how are

they accomplishing it? Are there differences among assessment systems in actual

practice?

CHAPTER 3

PROPOSITIONS AND RESEARCH QUESTIONS

Introduction

Given that little theory currently exists for the comprehensive assessment of the

IS function, what should organizations assess and how should it be done? Based on the IS

assessment theory currently available, and drawing from the literature of organizational

effectiveness and quality management, a comprehensive, IS assessment framework was

developed. The framework (or model) specifies the areas, dimensions, or activities of the

IS function that should be assessed and suggests appropriate measures for each

assessment area. Given this comprehensive IS assessment framework, what are current IS

assessment practices? Do the IS assessment systems in practice differ by organizational

and/or industry characteristics?

Development Of IS Assessment Framework

Organizing the Measures

Existing Research Support: While many steps toward the development of an IS

assessment framework have been taken, the journey is still in progress. In discussing how

upper management wants to measure the IS function by its contribution to the business,

Moad (1993) presented a framework for evaluating the IS function, developed by the

Ernst & Young Center for Information Technology and Strategy. This framework is a 3-

by-3 matrix of 9 different categories of performance of the IS function. One axis contains

the sources of the IS function's performance, namely, individual, work group, and

business unit. The other axis describes the area of company impact, that is, technology-enabling impact, organizational process outcome, and economic performance. No assistance is offered in developing measurement criteria or in suggesting useful measures for each category. Others have also developed IS assessment frameworks (Beise, 1989; Dickson et al., 1988; Wells, 1987). But the two assessment frameworks described next are the most recent and the most comprehensive.

DeLone and McLean's IS Success Model: DeLone and McLean (1992) created the I/S success model (See Figure 1) and suggested that researchers should "systematically combine individual measures from the I/S success categories to create a comprehensive measurement instrument" (pp. 87-88). Their model rests on the foundation of the work of Shannon and Weaver (1949) and Mason (1978). DeLone and McLean began with the definition of information as the output of an information system or the message in a communication system and noted that it can be measured at different levels. These levels include the technical level, the semantic level, and the effectiveness level. Shannon and Weaver (1949) used accuracy and efficiency of the system producing the information as the definition of the technical level; the level of success in relating the intended meaning as the definition of the semantic level; and the effect of the information on the receiver as the definition of the effectiveness level.
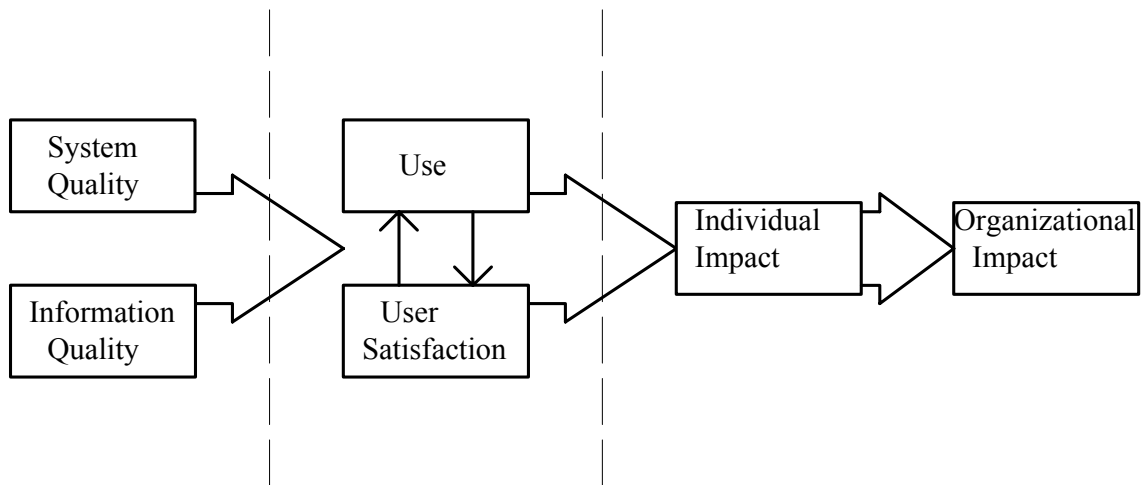
Figure 1 - IS Success Model (DeLone & McLean, 1992, p. 87)

Mason (1978) extended the Shannon and Weaver (1949) model by re-labeling

effectiveness as influence and presented this level as a series of events that take place at

the receiving end of an information system: receipt of the information; influence of the

information on the receiver; and influence of the information on the performance of the

system. "The concept of levels of output from communication theory demonstrates the

serial nature of information (i.e., a form of communication). . . . In this sense, information

flows through a series of stages from its production through its use or consumption to its

influence on individual and/or organizational performance" (DeLone & McLean, 1992, p.

61). DeLone and McLean suggested that Mason's extension of communication theory to

the measurement of IS implies the need for separate success measures for each level of

information. They reviewed the IS literature and collected empirical measures of each of

the six dimensions of their model. They emphasized the need for additional research to

test their model and for the selection of measures of each IS success dimension. "The

selection of measures should also consider the contingency variables, such as the

independent variables being researched; the organizational strategy, structure, size, and

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environment of the organization being studied; the technology being employed; and the task and individual characteristics of the system under investigation" (p. 88).

The DeLone and McLean (1992) IS success model is an attempt to reflect the interdependent, process nature of IS success. Their model depicts the relationships of the 6 IS success dimensions. They contend that

> SYSTEM QUALITY and INFORMATION QUALITY singularly and jointly affect both USE and USER SATISFACTION. Additionally, the amount of USE can affect the degree of USER SATISFACTION — positively or negatively — as well as the reverse being true. USE and USER SATISFACTION are direct antecedents of INDIVIDUAL IMPACT; and lastly, this IMPACT on individual performance should eventually have some ORGANIZATIONAL IMPACT (pp. 83-87).

These IS success dimensions are the foundation for the proposed framework for assessing the effectiveness of the IS function. DeLone and McLean's IS success model is the most comprehensive IS assessment model offered by IS research thus far. Yet they emphasize that additional research is required to authenticate the model's validity. Seddon and Kiew (1994) were the first to publish an empirical test of the DeLone and McLean IS success model. They examined a slightly modified version of the first four dimensions of the model and the relationships between them. The results of their examination provided support for DeLone and McLean's model.

DeLone and McLean (1992) also suggested that arbitrarily selecting measures from each of the six dimensions of IS success to form an overall IS success instrument is not recommended. Instead, further research should be conducted by systematically

combining individual measures from the IS success dimensions to develop a
comprehensive measurement instrument, while considering contingency variables, such
as the independent variables being researched; the organizational strategy, structure, size,
and environment of the study organization; the technology; and the task and individual
characteristics of the system being studied. "It is unlikely that any single, overarching
measure of I/S success will emerge; and so multiple measures will be necessary, at least
in the foreseeable future" (p. 83). Other researchers agree (K. Cameron, 1986; W.
Carlson & B. McNurlin, 1992; 1992; Landen & Landen, 1990; Mahoney & Weitzel,
1970; Rockart & Short, 1989; Saunders & Jones, 1992; Scudder & Kucic, 1991).

Saunders and Jones' Model: Saunders and Jones (1992) developed the "IS Function
Performance Evaluation Model" (Figure 2) which was used to describe how measures
should be selected from the multiple dimensions of the IS function relative to specific
organizational factors and based on the perspective of the evaluator. Saunders and Jones
conducted a Delphi study that examined how IS function performance dimensions were
ranked in importance by IS executives, how the IS executives measured performance in
each dimension, and the value they placed on the measures. The authors also interviewed
several chief executive officers (CEO) of the study organizations to find out the degree of
their awareness of and support for IS function activities, and to detect the level of
agreement between CEOs and CIOs on the manner in which the IS function is assessed.
The highest-ranked dimension was the IS function impact on strategic direction, followed
by the integration of the IS function planning with corporate planning, the quality of
information outputs, and the IS function's contribution to organizational financial
performance. The measures used in the highest-ranked dimensions tended to be weak,

surrogate measures and were not as highly valued by the IS executives as the more direct

measures of the operational efficiency of the IS function, such as system response time

and system availability. The authors suggested that one reason for this contradiction

might be the fact that IS operational efficiency has been stressed for years while IS

impact on strategic direction is a fairly new dimension and measures are still being

developed. They also propose that "as the IS function matures, measures likely change

from a structured focus on operational efficiency and user satisfaction to a more

unstructured concern for IS impact on strategic direction" (p. 80).
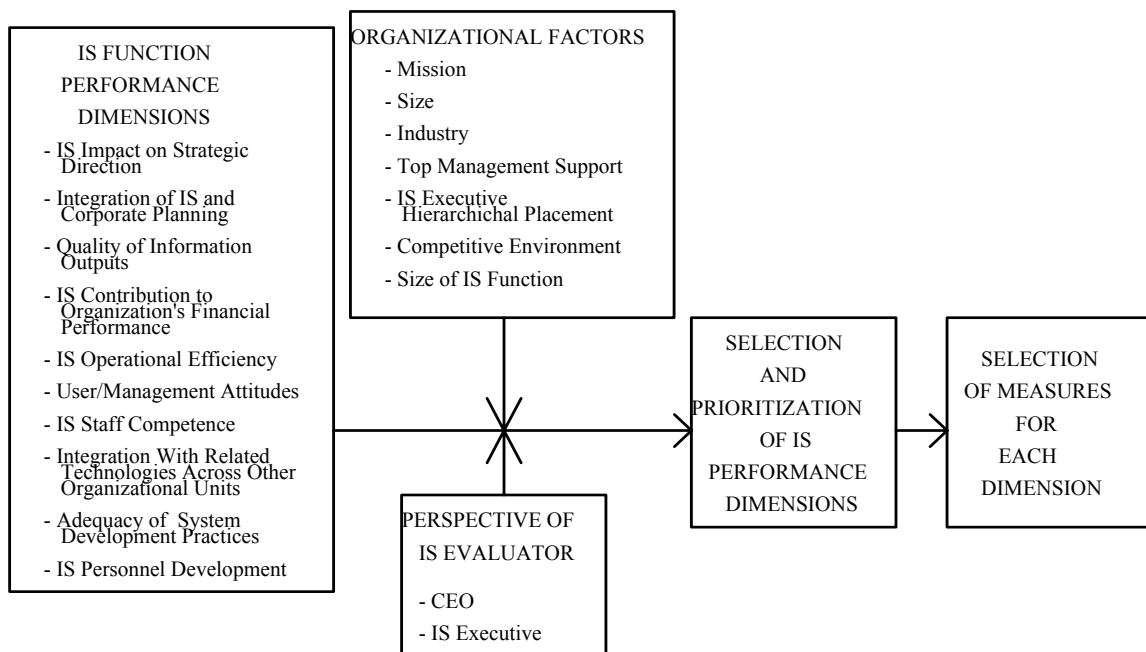
Figure 2 - IS Function Performance Evaluation Model (Saunders & Jones, 1992, p. 66)

The IS function performance evaluation model offered by Saunders and Jones

(1992) provides additional knowledge to the developing theory for IS assessment. By

comparing the IS assessment perspectives of the CEO with the CIO, they provide a

unique perspective for IS assessment, previously suggested by Cameron (1986) and

others (Hamilton & Chervany, 1981b; Van de Ven & Ferry, 1980; Wilkes, 1987). They also contribute to a better understanding of the important IS success dimensions, the need to balance measures across dimensions, and the need to consider the maturity level of the IS function in an IS assessment model. These factors, evaluator perspective, organizational factors, and maturity of the IS function, provide starting variables for further development of a contingency theory for IS assessment.

Yet their model cannot be considered a comprehensive, IS assessment model for several reasons. Their study sample was relatively small and was taken from firms in only three, selected cities in Texas, which leads us to question the generalizability of their results. No consideration is given to the interdependent, process nature of the performance of the IS function (DeLone & McLean, 1992) or to the suggested frequency of assessment. They also provide a very limited and inadequate list of suggested measures for each dimension. Even though the contribution to IS assessment theory by Saunders and Jones (1992) is significant, extension and further improvement is still required to provide the comprehensive model for IS assessment demanded by organizations today. Extension and further enhancements are necessary to provide a more complete and comprehensive set of IS assessments and a method for deciding what is appropriate given specific organizational and environmental factors (i.e. a contingency theory). Different elements of each of these two models will be used as a basis for the development of a more comprehensive model for IS assessment.

A Comprehensive IS Assessment Framework: There is considerable overlap in these two models. Several of the DeLone and McLean (1992) categories of IS success are represented by one or more of the Saunders and Jones (1992) performance dimensions.

For example, the Saunders and Jones dimensions "IS impact on strategic direction," "IS contribution to organization's financial performance," "integration of IS and corporate planning," and "integration with related technologies across other organizational units" could all be considered as sub-dimensions of "organizational impact." Also, "quality of information outputs" corresponds to "information quality," "user/management attitudes" corresponds to "user satisfaction," and "adequacy of system development practices" and "IS operational efficiency" roughly correspond to "system quality." "IS personnel development" was replaced as a performance dimension by the Saunders and Jones Delphi group by "ability of IS function to identify and assimilate new technologies." But, this dimension was the lowest ranked, the least used, and the two measures used to assess performance on that dimension had the lowest mean values of all measures listed. Therefore, these two dimensions will receive no further consideration.

"IS staff competence" is also not included in the DeLone and McLean model — understandably — since they found no empirical research using measures of IS staff competence as a measure of IS success. Staff competence is not unique to the IS function. Typically, organizations have formal review processes to measure the staff competence of the entire organization. It is an important assessment dimension and should not be neglected by the IS manager. Furthermore, IS staff competence is subsumed by the proposed "service quality" dimension discussed below and will not be included as a separate dimension of this framework for IS assessment.

The comprehensive, IS assessment framework, in addition to the DeLone and McLean (1992) dimensions, will include a "service quality" dimension (Pitt, Watson, & Kavan, 1995) and a "work group impact" dimension (Figure 3). The measures selected by
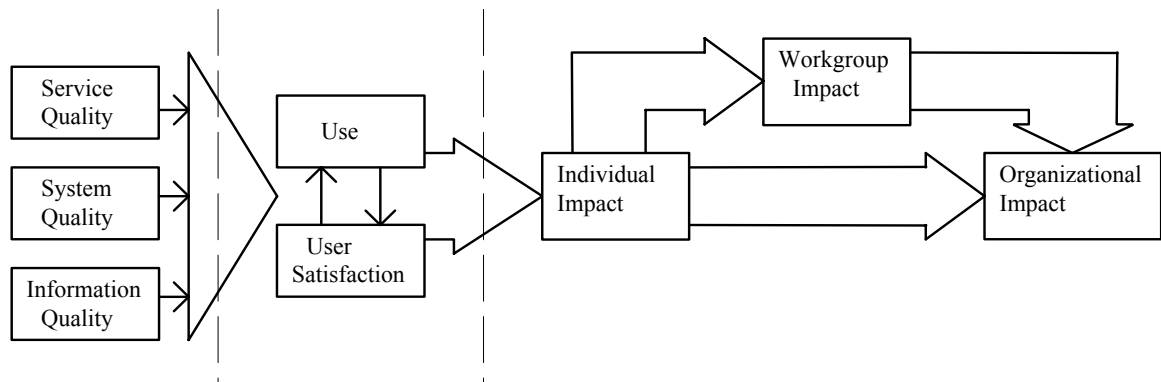
Figure 3 - Comprehensive IS Assessment Model: Organizing the Measures

the IS manager should be balanced across the dimensions, include indicators of both effectiveness and ineffectiveness (paradox), and be developed in cooperation with the work groups involved. Periodically, key measures from each dimension of the IS assessment system should be benchmarked against the performance of other firms.

Service quality, system quality, and *information quality* singularly and jointly affect both *use* and *user satisfaction.* Also, the amount of *use* can affect the degree of *user satisfaction* — positively or negatively — as well as the reverse being true. *Use* and *user satisfaction* are direct antecedents of *individual impact*; this *impact* on individual performance should have some *work group impact* for most organizations and in some cases may also directly lead to an *organizational impact*; and, finally, this *impact* on work group performance should eventually have some *organizational impact.*

Research Questions

The operable research questions for this study are:

Q$_1$: Is the IS assessment framework comprehensive and complete?

One of the objectives of this study was to present a comprehensive framework broad

enough to facilitate categorization of all previous IS assessment research, but at the same

time detailed enough to suggest specific areas of study (Ives, Hamilton, & Davis, 1980).

The question was not tested using the traditional, statistical methods. It was examined by

mapping previous research to each dimension of the framework. This activity not only

validates the completeness of the framework, it also shows the areas of IS assessment that

require further study and provides an extensive list of possible measures to select for each

assessment dimension.

Q$_2$: Does the IS assessment framework exhibit high content validity to

practitioners (IS managers)?

This question was examined by asking practicing IS managers and subject matter experts

if the framework makes sense to them, and by conducting a survey of a small sample of

practicing IS managers to learn what measures they currently assess in each dimension.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

This chapter describes the process used to conduct this dissertation research. The first section describes the type of research and research design. The next section describes the evaluation process of the IS assessment framework followed by a description of the development and evaluation of the survey instrument. Finally, the last section summarizes the research methodology.

Type of Research and Research Design

This work includes a theory-building, exploratory, and descriptive (taxonomic, non-experimental) study. Kerlinger (1986) describes taxonomic research as "research with the purpose of discovering, classifying, and measuring natural phenomena and the factors behind such phenomena."

Framework Evaluation

To validate the assessment framework, the researcher performed a literature review to find all research related to IS assessment, evaluation, measurement, and performance. The literature review began by searching multiple appropriate literature databases, such as ABI/Inform, FirstSearch, and INSPEC, collecting and reading the relevant articles found, and by reviewing the bibliography of each relevant article for other relevant articles, which were also collected and read. The researcher, with the assistance of Drs. Prybutok and Kappelman, documented the results of the literature

review in a research paper published in the *Information Resources Management Journal* (Myers et al., 1997).

<div align="center">Literature Review Results</div>

DeLone and McLean's (1992) extensive literature review and tables of success measures for each dimension will not be duplicated here. Rather, to build on their work, each of the six original dimensions are updated with suggested measures from work in other disciplines or from work published since 1988. Also, the two additional dimensions of IS success are defended as worthy to be included in the model and possible measures are presented. Finally, the beginnings of a contingency theory for IS assessment are suggested to guide senior IS managers in selecting appropriate dimensions and measures for their organizations.

Service quality

A service quality perspective views organizations as a collection of multiple processes with the goal of providing the customer with a high-quality service. Service quality is applicable to the IS function, since IS can be considered a service function that serves the information technology needs of the larger organization. The growth of end-user computing, decentralization, and the available choices for sources of IS services, promotes greater discretion by the customers of the IS function in their use and procurement of IS services. To meet the demands of this increasingly market-driven environment, the IS manager must be sensitive to the expectations of their customers and understand the perceived value placed on their services by their customers (Kettinger & Lee, 1994). Moreover, customers recognize and appreciate quality in service areas such as responsiveness to special needs, reliability, courtesy, and communication just as much

as, if not more, than the technical specifications of a product or the appropriateness of the information provided (Ferguson & Zawacki, 1993).

Recognition of the importance of measuring the service quality of the IS function has only recently appeared in IS literature (Ferguson & Zawacki, 1993; Kettinger & Lee, 1994; Pitt et al., 1995). But, the marketing literature provides considerable help for the IS manager in knowing how to measure and improve service quality. Parasuraman, Zeithaml, & Berry (1985) listed the dimensions of service quality (or "determinants") as:

Reliability - consistency of performance and dependability; service performed right the first time;

Responsiveness - willingness/readiness of employees to provide service in a timely manner (promptness);

Competence - possession of the required skills/knowledge to perform the service;

Access - approachability and ease of contact; convenient hours and location;

Courtesy - politeness, respect, consideration, and friendliness or contact personnel;

Communication - keeping customers informed in language they understand and listening to them;

Credibility - trustworthiness, believability, honesty; having the customers best interests at heart;

Security - freedom from danger, risk, or doubt;

Understanding/knowing the customer - making the effort to understand the customer's needs; and

Tangibles - physical evidence of the service, including facilities, personnel appearance, tools or equipment, etc.

They developed these further and gave examples of survey questions to measure levels of each determinant in their subsequent book (Zeithaml et al., 1990). The development and testing of an instrument to measure service quality, SERVQUAL, are discussed in additional articles by these researchers (Parasuraman, Berry, & Zeithaml, 1991a, 1993; Parasuraman, Zeithaml, & Berry, 1988, 1994a, 1994b). They also give practical advice for understanding customer expectations of service and for improving quality of service (Berry & Parasuraman, 1992; Berry, Parasuraman, & Zeithaml, 1984, 1988, 1994; Berry, Zeithaml, & Parasuraman, 1990; Parasuraman, Berry, & Zeithaml, 1991b; Zeithaml, Berry, & Parasuraman, 1988, 1993). Other viewpoints on the nature of service quality are available (Rust & Oliver, 1994).

Babbar (1992) extended the service quality model to include system hardware and networking requirements and the dynamics of system operation and control. Nath (1992) used the work of Parasuraman et al. (1985) to develop a framework to improve service quality. His framework involves the examination of the interfaces between the customer, the employee, and the existing IS applications to detect where applications of information technology will alter the interfaces in a positive way either for the customer or the organization. The effect of the change on the customer should be evaluated in terms of how it influences the ten determinants of service quality listed above. Funston (1992) developed a service quality model and depicted gaps in service quality, communication, delivery, and design where measurement and improvement are possible. Performance evaluation should be linked to service quality at all levels and the customer should be built into these evaluations. Return on quality (ROQ) provides a method for evaluating

the financial impact of service quality improvements to the business (Rust, Zahorik, & Keiningham, 1995).

Considering the IS function as a service and applying the principles of service quality can yield many opportunities to show the value of the IS function to the organization (Remenyi & Money, 1994; Santosus, 1995). But, measuring service quality is difficult and often ambiguous (Cheng & Ngai, 1994); moreover, currently-used measures are problematic (Van Dyke, Kappelman, & Prybutok, 1997; Van Dyke, Prybutok, & Kappelman, 1999). Further study of how to reliably assess this important IS success dimension is needed. While service quality measures are important for assessing the IS function, using them alone in an assessment system will not provide a thorough understanding of the total contribution of the IS function to the organization.

System quality

In addition to the many measures of the information processing system itself from empirical studies listed by DeLone and McLean (1992), such as, reliability, response time, ease of use, usefulness, flexibility, accessibility, etc., cost benefit analysis was presented as a worthwhile measure of the value of individual information systems (Ford, 1994; Keim & Janaro, 1982; King & Schrems, 1978; Mason & Sassone, 1978; Matlin, 1979; Oman & Ayers, 1988; Thompson & Cannon, 1978). Others recommended post-project evaluations or audits (Ahituv, Even-Tsur, & Sadan, 1986; James Brian Quinn & Martin Neil Baily, 1994). Rainer and Watson (1995) also examined ease of use as well as the presence of specific functions of the system as measures of system quality in their study of executive information system success.

Information quality

Sääksjärvi and Talvinen (1993) used content, availability, and accuracy as measures of information quality in their study of two specific marketing information systems. In their study of the keys to executive information system success, Rainer and Watson (1995) used accuracy, timeliness, conciseness, convenience, and relevance of the information as measures of information quality.

Use

Information systems can improve the quality and productivity of individuals, groups, and organizations, only if they are actually used. DeLone and McLean (1992) provided a lengthy list of IS use studies. In addition, Markus and Keil (1994) suggest that organizations should approach system development as business process reengineering and ensure that implement ability, or use, is built in. Rather than develop an IS to solve organizational problems and mandate its use, Markus and Keil argue that system use is inevitable when the interests of developers and users are aligned, good system design concepts jointly developed by users and developers are used, and system use is encouraged through rewards and incentives. Sääksjärvi and Talvinen (1993) measured use of each subsystem of the two marketing information systems they studied as well as the relative usage of each and the integration of usage of the two systems. Le Blanc and Kozar (1990) found that increases in decision support system (DSS) usage were associated with reductions in marine casualties on the lower Mississippi River.

User satisfaction

As discussed by DeLone and McLean (1992), user satisfaction is probably the most widely used single measure of IS success and they provided a summary of the studies and a list of the measures used in measuring user satisfaction. Bailey and Pearson

(1983) presented a 39-item instrument for measuring user satisfaction. Ives, Olson, and Baroudi (1983) added four items to the Bailey and Pearson instrument to measure overall user information satisfaction (UIS) and developed a short form of the UIS instrument. Baroudi and Orlikowski (1988) evaluated the psychometric properties of the short-form UIS instrument and found it to be reasonably valid and reliable. This short-form UIS instrument has seen wide use, but also has been criticized. Melone (1990) questioned its use since the UIS construct had not been integrated with user attitude theory. Galletta and Lederer (1989) found that the short-form UIS instrument did not exhibit test/retest reliability, but that four summary questions of overall satisfaction did behave reliably.

One recent study of the short-form UIS instrument examined the underlying construct for UIS (Doll, Raghunathan, Lim, & Gupta, 1995). The result of their analysis supports the use of the short-form, 13-item instrument as a measure of overall UIS. Kettinger and Lee (1994) compared the SERVQUAL instrument with the UIS instrument and found that they were generally mutually exclusive and complementary. So, both service quality and user satisfaction should be measured. But the reliable measurement of user satisfaction requires further study. Perhaps researchers should go back to Bailey and Peason's original 39-item instrument for further study. Maybe concentrating so much study on a subset of the original instrument, when a different subset of questions may better measure the UIS construct is wasting effort.

Conrath and Mignen (1990) found that even though the literature extols the measurement of user satisfaction, very few are actually measuring it. Only 26 percent of their sample of large Canadian firms had any formal mechanism in place to measure customer satisfaction.

Individual impact

Sääksjärvi and Talvinen (1993) used overall benefit of system usage to measure the impact of two specific marketing information systems on the users. Rainer and Watson (1995) measured impact on executive work with the operational variables: improve executive efficiency, enable executives to make higher-quality decisions, improve communications, improve operational control, and improve executives' mental model of the firm. Dickson, Senn, and Chervany (1977) provided a summary of research programs administered between 1970 and 1975 that were conducted to examine the significance of various information system characteristics on decision activity. These experiments used a variety of measures as dependent variables, including decision quality, decision time, decision confidence, user evaluation, and estimated outcomes.

Work group impact

DeLone and McLean's (1992) model addresses the impact of the IS function on individual and organizational performance, and assumes a flow of influence from the individual through intermediate stages to the organization. The impact of the IS function on work group performance is an important intermediate stage between the individual and the organization. The current organizational environment of many firms places a greater emphasis on the role of teams in the workplace (Alavi & Keen, 1989; Grohowski, McGoff, Vogel, Martz, & Nunamaker, 1990) and therefore, a corresponding emphasis on work group-level performance. In fact, Barua, Kriebel, and Mukhopadhyay (1995) found "that the most significant contributions of IT investments occur at low organizational levels where they are implemented" (p. 20). They also confirmed that the intermediate

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level contributions positively affected organizational performance measures such as return on assets (ROA) and market share.

As discussed before, Moad (1993) presented the Ernst & Young framework for evaluating IS. It is a 3-by-3 matrix that list the sources of impact as technology-enabling, organizational process outcome, and economic performance on the individual, work group, and business unit. The work group level is explicitly included as an important unit of measure for the evaluation of the impact of IS. The work group is also included in the levels of analysis between individual and organization by Bakos (1987).

Electronic meeting systems (EMS) have been used to support strategic management planning groups successfully as measured by improved equality of participation, reduced production blocking, reduced evaluation apprehension, and improved communication across the hierarchy (Tyran, Dennis, Vogel, & Nunamaker, 1992). In a study of negotiating groups using EMS, the measures of success included effectiveness of the original solutions and solution quality, efficiency in terms of total comments and file size, and satisfaction with the group process, ideas generated, evaluations, and overall, and general questions "remain in group?" and "how much fun?" (Nunamaker, Dennis, Valacich, & Vogel, 1991). They also found that larger groups were able to function effectively using the EMS than were possible with no support. Others report similar results (Dennis, Heminger, Nunamaker, & Vogel, 1990; Grohowski et al., 1990). Herniter, Carmel, and Nunamaker (1993) reported that EMSs could improve the efficiency of the negotiation process during union bargaining. Two companies that used EMS during bargaining for tasks like writing proposals and tracking agreements, ratified

contracts with their unions more quickly and with fewer disputes than in previous sessions.

In another study of EMS implementation in a large corporation, researchers found increased participation, fewer meetings over less time are required to solve problems, participants stay focused on task, pre-planning of meetings takes on increased importance, post-meeting distribution of the session data is crucial, low levels of participant computer competence have not deterred effective use, meeting room environment should match the characteristics of the group, software systems must be flexible to meet the variety of group applications, an infrastructure of staff and support is crucial to EMS success, EMSs help provide an organizational memory concerning related meetings, EMSs provide structure and control mechanisms for the meeting, and the propensity to use the EMS reveals its value (Grohowski et al., 1990). All of these factors are potential measures of success for IS impact on work groups.

Jarvenpaa, Rao, and Huber (1988) used meeting thoroughness, meeting equality, meeting equity, meeting quality, and participants' satisfaction as dependent measures in comparing conventional and two types of meeting support technology. The various studies evaluating group decision support systems (GDSS) and EMSs were organized and summarized and a taxonomy of environments for EMSs were developed by Dennis, George, Jessup, Nunamaker, and Vogel (1988). This work provides an extensive source of success measures for evaluating IS impact on the work group. A comprehensive overview of EMS development, theoretical foundations, applications, effects, and benefits is available (Nunamaker, Dennis, Valacich, Vogel, & George, 1991).

In a survey of potential users of work group computer-support tools, Satzinger and Olfman (1995) found that support for group work between meetings was perceived to be more useful than either support for face-to-face or electronic meetings, and traditional single-user tools were perceived to be more useful than multi-user group tools. Dean, Lee, Orwig, and Vogel (1994) studied the task of business analysis using EMS versus a single-user tool. They established that the EMS-based modeling tool allowed a greater number of individuals to participate efficiently in model development and models were developed between 175 percent and 251 percent faster with the EMS than with the traditional approach. They also incorporated measures of model quality into their evaluation. Gallupe and DeSanctis (1988) compared GDSS-supported and non-supported decision-making groups and found significantly better decision quality in those groups that received GDSS support. Implementers of GDSSs should be cautioned, though, since in this study, the decision confidence and satisfaction with the decision process of the group members were lower in the GDSS-supported groups than in the non-supported groups.

Organizational impact

In their study of the *InformationWeek* 500, Brynjolfsson and Hitt (1995) found that two broad strategic goals for IS investments emerged: Some focused on costs savings and improved management control while others had a customer orientation and made investments in quality, customer service, flexibility, and speed. Even though their productivity analysis was based on hard numbers such as revenue, labor costs, and capital costs, the customer-oriented companies had significantly better productivity performance and also achieved higher profits. Kelley's (1994) findings show that with programmable

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automation technology, manufacturers can produce the same output in about three-fifths

of the time it would ordinarily take on conventional machinery. Even greater reductions

in production time on the new technology are found with greater experience, more

extensive use of the technology, and changes in the organization of work. She was

successful in showing the value of investment in IT by focusing on the process innovated

by the IT application as the unit of analysis (rather than the entire plant or organization)

and by using a time-based indicator of productivity, unit production hours, while

controlling for product attributes and eleven other factors.

Quinn and Baily (1994) interviewed over 100 top managers in all major service

industries that were heavy users of IT, such as banking and financial services,

transportation, communications, retailing, etc. Whenever possible, these managers

attempted to quantify the return on investment (ROI) for each IT investment decision. In

most cases, benefits were practically impossible to estimate. They often decided to

purchase based on intuitive and non-financial judgments. Maintaining market share,

avoiding catastrophic losses, creating greater flexibility and adaptability, improving

responsiveness for new product lines, improving service quality, enhancing quality of

work life, increasing predictability of operations, post-project evaluations or audits, and

benchmarks, were all mentioned as possible ways to measure the benefits of IT

investment to the firm, but except for the last two, were almost impossible to quantify.

Cost benefit analysis may also be used to quantify the impact of the IS function

on the organization in an overall ROI calculation, but doing so is often difficult do to the

inability to adequately quantify intangible or qualitative benefits (Ford, 1994; Keim &

Janaro, 1982; King & Schrems, 1978; Mason & Sassone, 1978; Matlin, 1979; Oman &

Ayers, 1988; Semich, 1994). Some of the overlooked benefits of IT investments include turning over accounts receivables faster, shortening the monthly general ledger closing cycle, performing "what-if" analysis in real time during the financial planning cycle, reducing system support costs, reducing the time and cost of preparing budgets, business plans, and proposals due to the increased availability of business data in real time, and reducing the cost of generating quarterly and annual statements (Semich). Other economic-type value measures include information economic analysis (Semich) and data envelopment analysis (DEA) (Chismar & Kriebel, 1985).

Harris and Katz (1991b) found evidence that firm performance in the home office operation of systems technology leaders in the life insurance industry was linked to the level of IT investment intensity. Their longitudinal analysis showed that the firms with the most improvement in their organizational performance exhibited higher growth in the ratio of IT expense to total operating expense and larger reductions in the ratio of IT costs to premium income. Neumann, Ahituv, and Zviran (1992) developed a measure for determining the strategic relevance of IS to the organization and included the following operational variables: fit of IS applications portfolio to the organization's critical success factors (CSFs), IS contribution to the organization's competitiveness, IS support to tactical management, IS support to operations, IS contribution to improving profitability, IS contribution to financial gains through improved operations, and perceived overall criticality of IS to the organization.

Sethi and King (1994) developed a multidimensional measure of competitive advantage called Competitive Advantage Provided by an Information Technology Application (CAPITA). The CAPITA dimensions consist of efficiency, functionality,

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threat, preemptiveness, and synergy. They suggest CAPITA might be used for competitive assessment, including justifying and evaluating applications and acting as dependent variables in empirical competitive advantage research. Mahmood and Mann (1993) summarized the research on IT impacts on organizational performance in a handy table with a list of IT investment measures and corresponding organizational performance measures. Using the data on one hundred firms reported in the *ComputerWorld* "Premier 100" in 1989, Mahmood and Mann conducted a canonical correlation analysis to discover relationships among organization performance and information technology investment variables. They found that when evaluating the impact of IT investment on organizational performance, performance measures such as sales by total assets, market value to book value, return on investment, sales by employee, and return on sales should be considered. The measures to be considered for use as measures of IT investment include IT budget as a percentage of revenue, percentage of IT budget spent on IT training, number of PC's and terminals as a percentage of total employees, and estimated IT value as a percentage of revenue.

Le Blanc and Kozar (1990) found that increases in decision support system (DSS) usage were associated with reductions in marine casualties on the lower Mississippi River. Palvia, Perkins, and Zeltman (1992) reported on the impacts of a self-named "organizational effectiveness system (OES)" developed and used by the Federal Express Corporation, called the PRISM system. It is an advanced, multi-technology system and includes core personnel functions, expanded personnel and organizational functions, and extensive external interface features. Organization impacts and benefits of the PRISM system consist of strategic benefits (organizational flexibility), impact on personnel

division, impact on management, impact on employees, and extra-organizational

relationships. The financial impact of implementing electronic data interchange (EDI) on

the Chrysler Corporation was estimated from reduced inventory holding costs, obsolete

inventory costs, transportation costs, and premium freight costs, as well as savings that

arose from preparing and processing documents electronically rather than manually. The

results estimate the savings to be over $100 per vehicle (Mukhopadhyay, Kekre, &

Kalathur, 1995).

Carlson and McNurlin (1992) discussed various measurement models for

measuring IT value, including the Kaplan and Norton "balanced scorecard" (Kaplan &

Norton, 1992). It consists of four views (customer, internal business, financial, innovation

and learning) and suggested measures for each. Carlson and McNurlin called the

balanced scorecard a "simple, yet elegant, measurement framework for integrating the

diverse kinds of metrics that are important to management" (p. 8). The Ernst and Young

framework for evaluating IS called the Value Management Framework (Moad, 1993)

discussed earlier suggested that measures of IS impact on the organization should include

the technology-enabling impact, organizational process outcome, and economic

performance.

<div align="center">Contingency Theory Development</div>

Selecting the Dimensions and Measures

The list of measures for each IS success dimension provided here, supplemented

with the lists collected by DeLone and McLean (1992), supply the IS manager with an

abundant resource for selecting measures for his or her organization. But several

questions remain unanswered: What are the appropriate IS success dimensions that

should be assessed for each organizational and external environmental context? Once the appropriate dimensions are selected, what are the appropriate measures to assess performance in each dimension, again, given the context of the organization and external environment? Finally, how should these IS success dimensions and measures be selected?

The purpose of considering a contingency theory for IS assessment stems from the goal of providing guidance for an IS assessment selection strategy that neither dictates a universal solution that is unrealistic for most organizations nor advocates a situation specific view that provides no assistance beyond the given context. Contingency theories propose that different strategies are appropriate for each competitive business setting. They differ from the universal view by emphasizing, "it all depends" and they differ from the situation specific view by asserting that there are classes of settings for which strategic generalizations can be made (Hambrick & Lei, 1985).

To build a contingency theory for IS assessment, the relevant contingency variables must be listed (Hambrick & Lei, 1985). Hofer (1975) listed 54 variables that he thought should affect choices of strategies and theorized that product life cycle was the most crucial contingency variable. Hambrick and Lei (1985) reduced the list to 10 significant variables in their study: stage of product life cycle, consumer versus industrial sector, product differentiability, technological change, concentration rate, purchase frequency, industry imports, share instability, demand instability, and dollar importance to customer. The three most significant variables in their study were user sector, industrial or consumer; purchase infrequency; and stage of product life cycle. Keeping those contingency variables that were the most significant in moderating the effects of key strategic variables on performance reduced these lists of variables. In the absence of

empirical studies to assist in the selection of the most significant contingency variables

for IS assessment, all relevant factors should be identified and grouped into broad

categories, followed by empirical prioritization (Zeithaml, Varadarajan, & Zeithaml,

1988). The broadest categories of relevance to the IS function appear to be organizational

and external environmental.

Organizations are embedded in their environment, however they are not so tightly

fixed as to totally restrict strategic maneuvers (Hambrick, 1981). DeLone and McLean

(1992) mentioned the importance of considering other organizational and environmental

factors, such as those listed by Saunders and Jones (1992) (mission, size, industry, top

management support, IS executive hierarchical placement, competitive environment, size

of IS function, maturity of IS function, evaluator perspective) when selecting appropriate

measures for each dimension. In developing their model for IS research, Ives, Hamilton,

and Davis (1980) presented environmental variables that "define the resources and

constraints" of the IS function. For example, "the *external environment* includes legal,

social, political, cultural, economic, educational, resource and industry/trade

considerations. . . . *The organizational environment* is marked by the organizational

goals, tasks, structure, volatility, and management philosophy/style" (p. 916).

As previously discussed, the organizational effectiveness literature underscored

the need to define a theory or model of organizational effectiveness for the organization

before developing measures of effectiveness (Cameron & Whetten, 1983; Goodman &

Pennings, 1977). Many researchers assert that the perspective of the evaluator must be

considered and that there are often multiple perspectives to consider, such as the CEO

and the CIO (or IS executive) (Cameron & Whetten, 1983; Hamilton & Chervany,

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1981b; Saunders & Jones, 1992; Wilkes, 1987; Wilkes & Dickson, 1987). Zmud (1979) analyzed the empirical literature regarding the influence of individual differences upon IS success and found a clear indication that individual differences do exert a major force in determining IS success. As described before, the perspective of the evaluator is also significant. Often, incongruent perceptions of the definition of IS success exist between the CEO and CIO. The CEO is consistently focused on external factors such as market share and customer satisfaction. The CIO usually defines success by focusing on internal measures. This lack of agreement holds for the issue of how to measure the IS function. Many CIOs tend to concentrate on system and network up-time, reports delivered on time, number of errors, and control over expenses. While these are important, the CIO should also be assessing the IS function using many of the same factors as the CEO when measuring corporate performance, including market share, customer satisfaction, margin, and return on investment (Plewa & Lyman, 1992).

IS organizational maturity was found to be significantly related to user satisfaction (Mahmood & Becker, 1985) and as cited before, Saunders and Jones (1992) suggested that IS organizational maturity may impact on the relevance and usefulness of various measures to the IS manager. Corporate level strategy, organization structure, industry, organization size, business strategy, work group interdependence, culture, incentive system, information intensity of products and/ or services, IT management expertise, IT end-user skills, strategic role of IT, size of IS organization, IS budget size, user participation/involvement, history of organization, individual characteristics, task, climate, and location of the responsible executive are presented as potential contingency variables (Brown & Magill, 1994; Davis & Hamann, 1988; Ein-Dor & Segev, 1978;

Harris & Katz, 1991a; Mahmood & Becker, 1985; McKeen, Guimaraes, & Wetherbe, 1994; Premkumar & King, 1994; Scott, 1977; Weill & Olson, 1989; Wetherbe & Whitehead, 1977; Zmud, 1979).

The External Environment

The Organizational Environment

Service Quality

System Quality

Information Quality

Use

User Satisfaction

Individual Impact

Workgroup Impact

Organizational Impact
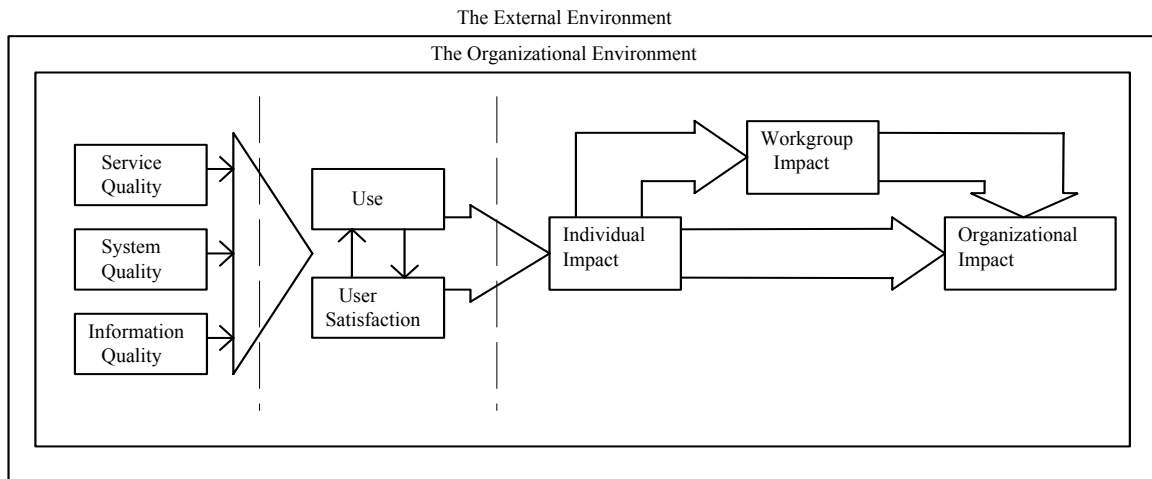
Figure 4 - IS Assessment Contingency Theory

Figure 4 depicts the contingency theory for IS assessment by showing the IS assessment model within the context of the organization and the external environment, but does not list the variables within the external and organizational environments mentioned above. Rather than attempt to list every variable and measure mentioned in this review in a table, Figure 5 summarizes the contingency theory for IS assessment using selected measures for each assessment dimension and selected organizational and external environmental variables.

Figure 5 - Contingency Theory for IS Assessment with selected measures/variables

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┌─────────────────────────┐        ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│ IS SUCCESS  DIMENSIONS  │              SELECTED
│   & Selected Measures   │        │   CONTINGENCY THEORY        │
│                         │             VARIABLES
│ SERVICE QUALITY         │        │                             │
│  - SERVQUAL             │         ┌──────────────────────────┐
│ SYSTEM QUALITY          │        ││ EXTERNAL  ENVIRONMENTAL │ │
│  - reliability          │        ││      VARIABLES          │
│  - response time        │        ││                         │ │
│  - ease of use          │        ││  - industry             │
│  - cost benefit analysis│        ││  - competitive environment│ │
│  - post-project evaluations│     ││  - culture              │
│      …                  │        ││  - economy              │ │
│                         │        ││  - availability of resources│
│ INFORMATION QUALITY     │        ││  - climate              │ │
│  - content              │        ││     …                   │
│  - availability         │        │└──────────────────────────┘ │
│  - accuracy             │
│  - timeliness           │        │                             │
│  - conciseness          │
│  - relevance            │        │                             │
│      …                  │
│                         │        │                             │
│ USE                     │
│  - subsystem use        │        │                             │
│  - relative usage       │
│  - increases in usage   │        │                             │
│  - frequency of use     │
│  - regularity of use    │        │                             │
│      …                  │
│ USER SATISFACTION       │        │                             │
│  - UIS                  │
│  - overall satisfaction │        │                             │
│  - decision-making satisfaction│
│  - enjoyment            │        │                             │
│  - information satisfaction│
│      …                  │        │ ┌──────────────────────────┐│
│ INDIVIDUAL IMPACT       │        │ │ ORGANIZATIONAL VARIABLES ││
│  - overall benefit of use│       │ │  - mission               ││
│  - improve executive efficiency│ │ │  - size                  ││
│  - higher-quality decisions│     │ │  - goals                 ││
│  - decision time        │        │ │  - top management support││
│  - decision confidence  │        │ │  - IS executive          ││
│      …                  │        │ │    hierarchichal placement││
│ WORK GROUP IMPACT       │        │ │  - maturity of IS function││
│  - improved participation│       │ │  - size of IS function   ││
│  - improved communication│       │ │  - structure             ││
│  - solution effectiveness│       │ │  - management philosophy/style││
│  - solution quality     │        │ │  - evaluator perspective ││
│  - meeting thoroughness │        │ │  - culture               ││
│      …                  │        │ │  - IS budget size        ││
│ ORGANIZATIONAL IMPACT   │        │ │     …                    ││
│  - cost savings         │        │ └──────────────────────────┘│
│  - improved customer service│    └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
│  - improved productivity│
│  - return on investment(ROI)│
│  - increased data availability│
│      …                  │
└─────────────────────────┘
```

┌──────────────────┐   ┌──────────────────┐
│   SELECTION   │   │   SELECTION   │
│   AND   │   │   OF MEASURES   │
│   PRIORITIZATION │   │   FOR   │
│   OF IS   │   │   EACH DIMENSION │
│   SUCCESS   │   │   │
│   DIMENSIONS   │   │   │
└──────────────────┘   └──────────────────┘

Survey Instrument Development

The first draft of the survey instrument is included in Appendix B. The researcher

developed it as a starting point for further development and refinement prior to the

extensive literature search described above. Drs. Wheeless, Prybutok, and Kappelman

provided substantial feedback and improvement suggestions on the survey draft. Dr.

Kappelman also provided a copy of the survey instrument developed to collect data for his Year2000 (Y2K) study (Kappelman & Keeling, 1997). Since the survey population (IS executives and/or Y2K project managers) targeted for the Y2K study was similar as for this study, it provided an excellent model for survey instructions, question wording and survey format. The researcher adapted the Y2K instrument for this study by removing the questions that were not relevant. Then the researcher checked each demographic question to ensure that it matched one of the significant contingency variables described above and removed the questions that did not match. Keeping with the Y2K question format, the researcher added the relevant questions for this study (see Appendix C).

Starting in Section 3 of the survey instrument, questions 1-6 request specific information for the IS organization about which the respondent will be answering. Then questions 7-16 match the IS assessment framework described above. Questions 7 and 8 serve to assess the overall organizational assessment system. Questions 9-16 each follow the same format: First a general question to determine if the organization measures that dimension of the framework followed by specific sub-questions for each of the measures of that dimension described in the DeLone and McLean (DeLone & McLean, 1992) article or found in the literature review. For example, question 10 (system quality) without the respondent marking area is duplicated below:

10. This IS organization measures the quality of the information processing system(s) it provides (**system quality**).
    10a. To assess our **system quality**, we measure:
        10a1. System reliability.
        10a2. Response time.
        10a3. Ease of use.

           10a4. Ease of learning.
           10a5. Convenience of access.
           10a6. Flexibility of system.
           10a7. Integration of systems.
           10a8. Perceived usefulness.
           10a9. Usefulness of specific functions.
      10b. Other **system quality** factors (please describe)

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_____

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To further judge the content validity of the survey instrument, the researcher asked Drs. Kappelman and Prybutok to evaluate it and provide comments, resulting in several iterations of adding improvements and further review. Dr. Jack Becker, director of the ISRC at the time, also evaluated the survey and cover letter and provided comments for improvement that were incorporated into these documents. Dr. Kathy Lassila (colleague at Univ. of Southern Colorado, ~16 years experience) and her former colleague, Dr. Megan R. MacMillan (~17 years experience) evaluated the survey instrument and offered constructive improvements that were also incorporated into the instrument. The researcher also submitted the cover letter and survey instrument to the University of North Texas (UNT) Institutional Review Board (IRB) for approval and received approval in the fall of 1997. Subsequently, the researcher also submitted the cover letter and survey instrument to the University of Southern Colorado Human Subjects Protection Committee and received approval March 12, 1998 (Appendix D).

The UNT Information Systems Research Center (ISRC) provided funding to support this study. The ISRC, a partnership between business and university, maintains an advisory board consisting of representatives from many companies, including

JCPenney Company, Inc., IBM, Southwest Airlines, etc. The researcher requested the assistance of members of the ISRC advisory board to further evaluate the survey instrument for content validity. At my request, at a quarterly meeting of the ISRC advisory board, the director handed out to the board members the survey instrument with a cover letter and a contact information form (See Appendix C). The cover letter and contact information form described the project and requested their participation. None of the approximately fifteen (15) board members present at the time returned the form or completed the survey at the meeting due to time constraints. In a follow up phone discussion with the director, he gave me a list of eight board members who expressed interest in the project and who may be willing to help. He also gave me their company of employment and phone numbers. After repeated attempts (minimum 2 phone calls) at making contact with those on the list, the researcher received one completed survey. This respondent also returned the completed contact information form, indicating that the respondent was willing to be available for additional contact. The respondent subsequently returned my phone call, providing a brief interview to confirm the respondent's understanding of the survey instructions and content and to confirm my understanding of the respondent's comments. The researcher also received comments on the survey instrument from several subject matter experts from one additional company.

Given the lack of sufficient numbers of completed surveys, the researcher pursued two other sources for survey respondents. Dr. Kappelman gave me the name and contact information for a colleague who had regular contact with a group of IS executives in the New York City area. After distribution of a set of surveys to this group, one anonymous completed survey was received by fax. The second source of potential respondents came

from a group of 13 students in the Executive MBA program of a large metropolitan university. The researcher received three completed surveys from this group, plus one set of comments on the survey.

CHAPTER 5

ANALYSIS/REVIEW OF RESPONDENTS AND RESULTS

In this chapter, a brief introduction is followed by a narrative description and

review of each of the study respondents.

Descriptive Findings

Taxonomic, descriptive research is often also known by the more generic term:

qualitative research. In describing the characteristics of qualitative research, Bogdan and

Biklen (1992) state "qualitative research is descriptive" (p. 28). They go on to say that

qualitative articles and reports often include quotations and describe results in narrative

form. I will now describe the responses from each study respondent, individually, and

summarize these results in the next chapter.

Respondent 1

Respondent1, an account executive for a large consulting firm, assigned to a

large, local airline food-service firm as their Vice-President of Information Services

completed the survey, returned it to me by fax and mail, and returned my follow up

phone call. During the phone interview, Respondent1 responded that the survey

instructions were clear and that he had no difficulty understanding what he was being

asked. Respondent1's answers to the survey questions were based on his experience at

the food-service firm.

Respondent1 checked response 'B – Privately-held company' for question 1. He

marked 'Yes' for question 2 (works for a division of a parent organization) and wrote in

'14,000' people work in his division with gross revenues of '$1,500,000,000' and marked 'J – Food Services' as the best description of the industry of his division. For question 2d, Respondent1 marked the following numbers on the 0-9 scale provided to indicate total disagreement (1) to total agreement (9) with each of the following statements beginning with the phrase "My division is dependent on information technology to:"

Introduce new products and/or services.	1
Create product and/or service differentiation.	6
Improve market access.	5
Establish competitive advantage.	5
Avoid competitive disadvantage	6
Other: <u>Cost Efficiency – High Labor</u>	9

For question 3, answering for his parent organization, Respondent1 did not write in answers for how many people work for his parent organization nor for the gross revenues or income, but instead wrote below the response boxes "Unknown, Private" and circled Unknown. During the phone interview, I asked Respondent1 if this information was unknown and private due to his role as an outsourced IT executive for the division to which he responded "yes." Respondent1 also related that it was his belief that this type of relationship was common practice for outsourced IT executives in similar roles. He did not have access to nor did he deem it necessary for him to know how many people worked for or the gross revenues or income of the parent organization of the division to which he was assigned. He marked 'J – Food Services' in response to question 3c the industry of his parent organization and marked '0' (meaning not applicable) for all statements in question 3d, the same statements shown above for question 2d.

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Starting in Section 2 of the survey, Respondent1 answered questions about himself. For question 1, he marked 'B – Vice President of' and wrote in "Information Services." He reports to the CFO. He wrote in the boxes provided "35" years indicating his age at the time of the survey. For questions 5, 6, and 7, Respondent1 wrote "01" in the boxes indicating that he had been with the parent organization for 1 year, in his present position for 1 year, and held only 1 position with the parent organization. Respondent1 marked 'G – A Master's degree (e.g., MBA, MS, MA)' for question 8. For the final question in Section 2 (number 9), Respondent1 marked that he is directly involved in assessing the IS area in his organization, that his responsibility for IS assessment had been assigned or appointed, that he has had the responsibility for IS assessment for "9" months at the division level of his organization.

The final section of the survey, Section 3, contains questions about the respondent's IS organization. Respondent1 marked 'B – Division' in question 1 to indicate that the remaining answers are about his division's IS organization. In question 2, he filled in $12,500,000 for the total operating budget of his IS organization. Question 3 requests the percentage of the total operating budget that is paid to IS outsourcers, consultants, and/or contract people to which Respondent1 wrote in "80" percent. He wrote in 0 on question 4 to indicate the number of people who work for this IS organization that are not outsourced employees, consultants, or contract people. But, he wrote in "38" in question 5 for the number of people employed by his IS organization that are full-time equivalent outsourced employees, consultants, or contracted. Respondent1 wrote in the margin of question 5 that these "38" employees are on site at this organization and are employees of two different outsourcing firms. For question 6,

Respondent1 indicated that the CIO reports to someone who reports directly to the highest manager/executive.

On question 7, Respondent1 indicated his level of agreement again using the 0-9 scale to the following statements that begin with the phrase 'This IS organization:'

Utilizes a comprehensive IS assessment system   3

Does extensive benchmarking to other IS organizations   6

Makes extensive use of the following methods to estimate the
cost of IS development, maintenance, and conversion projects.
    (1) number of lines of code   1

    (2) function points   1

    (3) other historical metrics   6

On question 8, Respondent1 indicated by marking the '1' on the scale that his organization does not follow the software development practices of the Software Engineering Institute's (SEI's) Configuration Maturity Model (CMM). With question 9, the survey follows the IS assessment model. That is, starting with question 9 and continuing through question 16, each question asks the respondent to mark their agreement level with the assertion that his/her organization measures that IS assessment dimension. Following each IS assessment dimension assertion, the name of the dimension is included in parentheses and highlighted in bold typeface to clearly reflect that assertions link with the IS assessment model. Each dimension question is followed by an assertion regarding each of the individual measures found in the literature for that dimension. Each dimension measurement list is followed by an 'Other (insert IS dimension) factors' statement followed by 4 blank lines to allow the respondent to write in other measurements used by his/her organization.

For question 9, Respondent1 marked '7' to indicate his agreement level that his organization measures the quality of the service it provides (service quality). Respondent1 marked the following agreement levels for each of the service quality indicators:

Tangibles: Physical facilities, equipment, and appearance of personnel	3
Reliability: Ability to perform the promised service dependably and accurately	8
Responsiveness: Willingness to help customers and provide prompt service	9
Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence	5
Empathy: Caring, individualized attention we provide our customers	5

Other **service quality** factors:

Business Process reliability	7
Service Level Agreement	7

For question 10, Respondent1 marked '8' to indicate his agreement level that his organization measures the quality of the information processing system(s) it provides (system quality). Respondent1 marked the following agreement levels for each of the system quality measures:

System reliability	9
Response time	8
Ease of use	5
Ease of learning	3
Convenience of access	5
Flexibility of system	2
Integration of systems	8

Perceived usefulness	5
Usefulness of specific functions	5
Other **system quality** factors:	
<u>Maintainability (Cost of ownership)</u>	6

For question 11, Respondent1 marked '6' to indicate his agreement level that his organization measures the quality of the information system(s) output it provides (information quality). Respondent1 marked the following agreement levels for each of the information quality measures:

Accuracy	7
Currency	7
Timeliness	7
Reliability	8
Understandability	1
Relevance to decisions	1
Completeness	6
Perceived usefulness	5
Comparability	5

Respondent1 marked nothing for other information quality factors and wrote in nothing.

For question 12, Respondent1 marked '1' to indicate that his organization does not measure the extent of use of the information system(s) it provides. Subsequently, Respondent1 marked nothing for each of the information use measures. The same was true for both questions 14 and 15, individual impact and workgroup impact.

For question 13, Respondent1 marked '5' to indicate his agreement level that his organization measures the user response to the use of the output of an information system (user satisfaction). Respondent1 marked the following agreement levels for each of the user satisfaction measures:

User satisfaction (39 items (Bailey & Pearson, 1983))	1
User information satisfaction (UIS, 13 items)	1
User satisfaction (other)	5
User enjoyment	1
User delight	1
Overall satisfaction	6
User dissatisfaction	7
User complaints	6
Decision-making satisfaction	1
System specific satisfaction	1

Respondent1 marked nothing for other user satisfaction factors and wrote in nothing.

For question 16, Respondent1 marked '6' to indicate his agreement level that his organization measures the effect of the output of an information system on organizational performance (organizational impact). Respondent1 marked the following agreement levels for each of the organizational impact measures:

Return on assets (ROA)	1
Return on investment (ROI)	6
Marketing achievements	1
Innovations	1

Market share	1
Stock price	1
Cost-benefit ratio	5
Cost reductions	8
Productivity	7
Economic value-added (EVA)	1

Respondent1 marked nothing for other organizational impact factors and wrote in nothing. Finally, Respondent1 did not include any other materials or comments with his completed survey.

<div align="center">Respondent 2</div>

Respondent2, an anonymous respondent from the 212 area code (Manhattan, NY), completed the survey and sent it to the researcher by facsimile. No contact information was provided to allow for follow up questions. Respondent2 did not return page 3 of the survey and did not complete item 2d, so no information was provided to describe Respondent2's parent organization nor whether or not Respondent2 works for a division of a parent organization. Therefore, it might be reasonable to assume that Respondent2 does not work for a division of the parent organization or that the organization does not have divisions.

For question 3, answering for his/her parent organization, Respondent2 wrote in "16,000" for how many people work for his parent organization and "$6,000,000,000" for the gross revenues or income. Respondent2 marked 'K – Banking, Securities, Investments' in response to question 3c the industry of his parent organization and in

question 3d marked the following values for the each of the statements beginning with

the phrase "My parent organization is dependent on information technology to:"

Introduce new products and/or services.   8

Create product and/or service differentiation.   8

Improve market access.   6

Establish competitive advantage.   7

Avoid competitive disadvantage   8

Respondent2 marked nothing and wrote in nothing for 'Other.'

Starting in Section 2 of the survey, Respondent2 answered questions about

himself/herself. Yet, Respondent2 did not return page 5, so the answers for questions 1-7

are not available for Respondent2, including job title, bosses job title, age, gender, years

employed by parent organization, years in present position and number of different

positions within the organization. Respondent2 marked 'E – 4 year college degree (e.g.,

BA, BS, BBA)' for question 8. For the final question in Section 2 (number 9),

Respondent2 marked that he/she is directly involved in assessing the IS area in his

organization, that his responsibility for IS assessment had been assigned or appointed,

that he has had the responsibility for IS assessment for "24" months at the parent level of

his organization. Respondent2 also marked an "*" above the word 'assessment' in

question 9a and wrote in the following at the bottom of the page next to another "*":

"You didn't define what Assessment means – it can take on many different

aspects, from formal (ala SEI CMM, ISO 9000, Baldridge) to mere opinion. My

reference here is to one of my roles, as performing a quarterly Performance

Measurement (against defined goals, & using well crafted metrics) of the

organization."

Respondent2 makes a valid point; the same point I make in chapter 3. No single

assessment method or assessment dimensions or criteria or list of measures is appropriate

for all organizations; hence the need for a contingency theory for IS assessment.

The final section of the survey, Section 3, contains questions about the

respondent's IS organization. Respondent2 marked 'A – Parent' in question 1 to indicate

that the remaining answers are about his parent's IS organization. In question 2, he/she

filled in "$1,300,000,000" for the total operating budget of his IS organization. Question

3 requests the percentage of the total operating budget that is paid to IS outsourcers,

consultants, and/or contract people to which Respondent2 wrote in "25" percent. He/she

wrote in 1200 on question 4 to indicate the number of people who work for this IS

organization that are not outsourced employees, consultants, or contract people. And,

he/she wrote in "1000" in question 5 for the number of people employed by his IS

organization that are full-time equivalent outsourced employees, consultants, or

contracted. For question 6, Respondent2 indicated that the CIO reports to someone who

reports directly to the highest manager/executive.

On question 7, Respondent2 indicated his/her level of agreement again using the

0-9 scale to the following statements that begin with the phrase 'This IS organization:'

Utilizes a comprehensive IS assessment system   6

Does extensive benchmarking to other IS organizations   6

Makes extensive use of the following methods to estimate the
cost of IS development, maintenance, and conversion projects.
    (1) number of lines of code   blank

(2) function points   6

(3) other _____   blank

On question 8, Respondent2 indicated by marking the '9' on the scale that his/her organization does follow the software development practices of the Software Engineering Institute's (SEI's) Configuration Maturity Model (CMM) and marked 'Repeatable (level 2) as the his/her organization's current level. With question 9, the survey follows the IS assessment model. That is, starting with question 9 and continuing through question 16, each question asks the respondent to mark their agreement level with the assertion that his/her organization measures that IS assessment dimension. Following each IS assessment dimension assertion, the name of the dimension is included in parentheses and highlighted in bold typeface to clearly reflect that assertions link with the IS assessment model. Each dimension question is followed by an assertion regarding each of the individual measures found in the literature for that dimension. Each dimension measurement list is followed by an 'Other (insert IS dimension) factors' statement followed by 4 blank lines to allow the respondent to write in other measurements used by his/her organization.

For question 9, Respondent2 marked '9' to indicate his/her agreement level that his/her organization measures the quality of the service it provides (service quality). Respondent2 marked the following agreement levels for each of the service quality indicators:

Tangibles: Physical facilities, equipment, and appearance of personnel   9

Reliability: Ability to perform the promised service dependably and accurately   8

Responsiveness: Willingness to help customers and provide prompt service   9

Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence   6

Empathy: Caring, individualized attention we provide our customers   3

Other **service quality** factors:

Availability of Service   blank

'MTTR' of all services   blank

For question 10, Respondent2 marked '8' to indicate his/her agreement level that his/her organization measures the quality of the information processing system(s) it provides (system quality). Respondent2 marked the following agreement levels for each of the system quality measures:

System reliability	3
Response time	6
Ease of use	3
Ease of learning	3
Convenience of access	3
Flexibility of system	3
Integration of systems	6
Perceived usefulness	7
Usefulness of specific functions	7

Other **system quality** factors:

On Time, On Budget delivery of systems   blank

Defect levels (not, however, reliability, per se)   blank

For question 11, Respondent2 marked '8' to indicate his/her agreement level that his/her organization measures the quality of the information system(s) output it provides

(information quality). Respondent2 marked the following agreement levels for each of the information quality measures:

Accuracy	8
Currency	8
Timeliness	8
Reliability	8
Understandability	3
Relevance to decisions	3
Completeness	8
Perceived usefulness	3
Comparability	3

Other **information quality** factors:

Recoverability	blank

For question 12, Respondent2 marked '3' to indicate his/her agreement level that his/her organization measures the extent of use of the information system(s) it provides. Subsequently, Respondent2 marked the following agreement levels for each of the information use measures:

Frequency of use	3
Percentage of time used	3
Use versus nonuse	3
Number of features used	3
Extent of use	8
Regularity of use	3

Voluntariness of use	3
Use at anticipated level	8
Motivation to use	blank

Respondent2 marked nothing for other information use factors and wrote in nothing.

For question 13, Respondent2 marked '8' to indicate his/her agreement level that his/her organization measures the user response to the use of the output of an information system (user satisfaction). Respondent2 marked the following agreement levels for each of the user satisfaction measures:

User satisfaction (39 items (Bailey & Pearson, 1983))	8
User information satisfaction (UIS, 13 items)	3
User satisfaction (other)	8
User enjoyment	1
User delight	1
Overall satisfaction	8
User dissatisfaction	8
User complaints	8
Decision-making satisfaction	1
System specific satisfaction	6

Respondent2 marked nothing for other user satisfaction factors and wrote in nothing.

For question 14, Respondent2 marked nothing to indicate that his/her organization does not currently measure the effect of the output of an information system on individual performance (individual impact). Respondent2 marked the following agreement levels for each of the individual impact measures:

Quality of decisions	1
Time to make a decision	1
Time to complete a task	1
Decision confidence	1
Number of (decision-making) alternatives considered	1
Amount of (decision-making) data considered	1
Overall benefit/worth to the user	1
User productivity improvement	1
User communication improvement	1

Respondent2 marked nothing for other individual impact factors and wrote in the following: "* But we're thinking about this!" and marked the measure 'User productivity improvement' with a "*".

For question 15, Respondent2 marked '1' to indicate that his/her organization does not currently measure the effect of the output of an information system on workgroup performance (workgroup impact). Yet, Respondent2 marked the following agreement levels for each of the organizational impact measures:

Participation level	1
Meeting frequency	1
Meeting quality	8
Communication quality	1
Problem solution quality	1
Team productivity	1
Meeting equity	1

Decision quality   1

Decision efficiency   1

Respondent2 marked nothing for other workgroup impact factors and wrote in the

following: "* We are considering this one" and marked the measure 'Participation level'

with a "*".

For question 16, Respondent2 marked nothing to indicate that his/her organization

does not currently measure the effect of the output of an information system on

organizational performance (organizational impact). Yet, Respondent2 marked the

following agreement levels for each of the organizational impact measures:

Return on assets (ROA)   6

Return on investment (ROI)   6

Marketing achievements   1

Innovations   1

Market share   1

Stock price   6

Cost-benefit ratio   6

Cost reductions   6

Productivity   6

Economic value-added (EVA)   blank

Respondent2 did not return the final page, so I assume other organizational impact factors

was left blank. Respondent2 wrote in the following: "* Soon" and marked the measure

'Economic value-added (EVA) with a "*". Finally, Respondent2 did not include any

other materials or comments with his/her completed survey.

Respondent 3

Respondent3, an anonymous student in the Executive MBA program of a large metropolitan university, completed the survey and sent it to the researcher by mail in the self-addressed envelope provided to the respondent. No contact information was provided to allow for follow up questions. For question 1, Respondent3 marked 'B – Privately-held company' and marked 'No' for question 2 indicating that he/she does not work for a division of a parent organization and appropriately skipped the remaining parts of question 2.

For question 3, answering for his/her parent organization, Respondent3 wrote in "15,000" for how many people work for his parent organization and "$500,000,000" for the gross revenues or income. Respondent3 marked 'P – Entertainment' in response to question 3c the industry of his/her parent organization and in question 3d marked the following values for the each of the statements beginning with the phrase "My parent organization is dependent on information technology to:"

Introduce new products and/or services.	7
Create product and/or service differentiation.	6
Improve market access.	7
Establish competitive advantage.	8
Avoid competitive disadvantage	8

Respondent3 marked nothing and wrote in nothing for 'Other.'

Starting in Section 2 of the survey, Respondent3 answered questions about himself/herself. Respondent3 marked 'E – Manager of' and wrote in "Computer Operations" for question 1 indicating his/her job title. He/she marked 'L – Vice-president

of' and wrote in "Information Technology" for question 2 indicating the primary job title of the person he/she reports to. For question 3, Respondent3 wrote in "36" to indicate his/her age. He marked 'Male' to indicate his gender, wrote in "2" for the number of years employed by his parent organization, wrote in "2" for the number of years in his present position and wrote in "1" for the number of different positions he has held within the organization. Respondent3 marked 'C – some college but no degree' for question 8. For the final question in Section 2 (number 9), Respondent3 marked that he is directly involved in assessing the IS area in his organization, that his responsibility for IS assessment had been assigned or appointed, that he has had the responsibility for IS assessment for "24" months at the parent level of his organization.

The final section of the survey, Section 3, contains questions about the respondent's IS organization. Respondent3 marked 'A – Parent' in question 1 to indicate that the remaining answers are about his parent's IS organization. In question 2, he filled in "$5,000,000" for the total operating budget of his IS organization. Question 3 requests the percentage of the total operating budget that is paid to IS outsourcers, consultants, and/or contract people to which Respondent3 wrote in "30" percent. He wrote in 30 on question 4 to indicate the number of people who work for this IS organization that are not outsourced employees, consultants, or contract people. And, wrote in "5" on question 5 for the number of people employed by his IS organization that are full-time equivalent outsourced employees, consultants, or contracted. For question 6, Respondent3 indicated that the CIO reports to someone who reports directly to the highest manager/executive.

On question 7, Respondent3 indicated his level of agreement again using the 0-9 scale to the following statements that begin with the phrase 'This IS organization:'

Utilizes a comprehensive IS assessment system	1
Does extensive benchmarking to other IS organizations	1

Makes extensive use of the following methods to estimate the
cost of IS development, maintenance, and conversion projects.

(1) number of lines of code	5
(2) function points	5
(3) other _____	blank

On question 8, Respondent3 indicated by marking the '1' on the scale that his

organization does not follow the software development practices of the Software

Engineering Institute's (SEI's) Configuration Maturity Model (CMM) and thus marked

nothing as the his/her organization's current level. With question 9, the survey follows

the IS assessment model. That is, starting with question 9 and continuing through

question 16, each question asks the respondent to mark their agreement level with the

assertion that his/her organization measures that IS assessment dimension. Following

each IS assessment dimension assertion, the name of the dimension is included in

parentheses and highlighted in bold typeface to clearly reflect that assertions link with the

IS assessment model. Each dimension question is followed by an assertion regarding

each of the individual measures found in the literature for that dimension. Each

dimension measurement list is followed by an 'Other (insert IS dimension) factors'

statement followed by 4 blank lines to allow the respondent to write in other

measurements used by his/her organization.

For question 9, Respondent3 marked '1' to indicate that his organization does not

measure the quality of the service it provides (service quality) and appropriately marked

nothing for each of the service quality indicators. For question 10, Respondent3 also

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marked '1' to indicate that his organization does not measure the quality of the information processing system(s) it provides (system quality) and appropriately marked nothing for each of the system quality measures.

For question 11, Respondent3 marked '6' to indicate his/her agreement level that his organization measures the quality of the information system(s) output it provides (information quality). Respondent3 marked the following agreement levels for each of the information quality measures:

Accuracy   7

Currency   6

Timeliness   8

Reliability   7

Understandability   5

Relevance to decisions   5

Completeness   7

Perceived usefulness   6

Comparability   5

Respondent3 marked nothing for other information quality factors and wrote in nothing.

For questions 12, 13, 14, 15, and 16, Respondent3 marked '1' to indicate that his organization does not measure the extent of use of the information system(s) it provides, user satisfaction, individual impact, workgroup impact, and organizational impact and appropriately marked nothing for each of the measures listed and marked nothing for other factors and wrote in nothing. Finally, Respondent3 did not include any other materials or comments with his/her completed survey.

Respondent 4

Respondent4, an anonymous student in the Executive MBA program of a large

metropolitan university, completed the survey and sent it to the researcher by mail in the

self-addressed envelope provided to the respondent. No contact information was provided

to allow for follow up questions. For question 1, Respondent4 marked 'A – Publicly-

traded company' and marked 'No' for question 2 indicating that he/she does not work for

a division of a parent organization and appropriately skipped the remaining parts of

question 2.

For question 3, answering for his/her parent organization, Respondent4 wrote in

"8500" for how many people work for his/her parent organization and "$2,200,000,000"

for the gross revenues or income. Respondent4 marked 'G – Capital Goods

Manufacturing' in response to question 3c the industry of his/her parent organization and

in question 3d marked the following values for the each of the statements beginning with

the phrase "My parent organization is dependent on information technology to:"

Introduce new products and/or services.	7
Create product and/or service differentiation.	6
Improve market access.	5
Establish competitive advantage.	8
Avoid competitive disadvantage	8

Respondent4 marked nothing and wrote in nothing for 'Other.'

Starting in Section 2 of the survey, Respondent4 answered questions about

himself/herself. Respondent4 marked 'E – Manager of' and wrote in "Data Processing"

for question 1 indicating his/her job title. He/she marked 'N – Other' and wrote in

"Director of Customer Services" for question 2 indicating the primary job title of the person he/she reports to. For question 3, Respondent4 wrote in "48" to indicate his/her age. He marked 'Male' to indicate his gender, wrote in "20" for the number of years employed by his parent organization, wrote in "8" for the number of years in his present position and wrote in "4" for the number of different positions he has held within the organization. Respondent4 marked 'E – 4 year college degree (e.g., BA, BS, BBA)' for question 8. For the final question in Section 2 (number 9), Respondent4 marked 'No' that he is not directly involved in assessing the IS area in his organization, and as directed, skipped the remaining parts of question 9.

The final section of the survey, Section 3, contains questions about the respondent's IS organization. Respondent4 marked 'A – Parent' in question 1 to indicate that the remaining answers are about his parent's IS organization. In question 2, he filled in "$120,000,000" for the total operating budget of his IS organization. Question 3 requests the percentage of the total operating budget that is paid to IS outsourcers, consultants, and/or contract people to which Respondent4 wrote in "25" percent. He wrote in 300 on question 4 to indicate the number of people who work for this IS organization that are not outsourced employees, consultants, or contract people. And, wrote in "100" on question 5 for the number of people employed by his IS organization that are full-time equivalent outsourced employees, consultants, or contracted. For question 6, Respondent4 indicated that the CIO reports to someone who reports directly to the highest manager/executive.

On question 7, Respondent4 indicated his level of agreement again using the 0-9 scale to the following statements that begin with the phrase 'This IS organization:'

Utilizes a comprehensive IS assessment system	5
Does extensive benchmarking to other IS organizations	6
Makes extensive use of the following methods to estimate the cost of IS development, maintenance, and conversion projects.	
(1) number of lines of code	6
(2) function points	6
(3) other _____	blank

On question 8, Respondent4 indicated by marking the '4' on the scale to indicate his agreement level that his organization does follow the software development practices of the Software Engineering Institute's (SEI's) Configuration Maturity Model (CMM) and marked '2 – Repeatable' as his organization's current level. With question 9, the survey follows the IS assessment model. That is, starting with question 9 and continuing through question 16, each question asks the respondent to mark their agreement level with the assertion that his/her organization measures that IS assessment dimension. Following each IS assessment dimension assertion, the name of the dimension is included in parentheses and highlighted in bold typeface to clearly reflect that assertions link with the IS assessment model. Each dimension question is followed by an assertion regarding each of the individual measures found in the literature for that dimension. Each dimension measurement list is followed by an 'Other (insert IS dimension) factors' statement followed by 4 blank lines to allow the respondent to write in other measurements used by his/her organization.

For question 9, Respondent4 marked '7' to indicate his agreement level that his organization measures the quality of the service it provides (service quality).

Respondent4 marked the following agreement levels for each of the service quality indicators:

Tangibles: Physical facilities, equipment, and appearance of personnel 1

Reliability: Ability to perform the promised service dependably and accurately 7

Responsiveness: Willingness to help customers and provide prompt service 7

Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence 5

Empathy: Caring, individualized attention we provide our customers 5

Respondent4 marked nothing and wrote in nothing for 'Other **service quality** factors.'

For question 10, Respondent4 marked '7' to indicate his agreement level that his organization measures the quality of the information processing system(s) it provides (system quality). Respondent4 marked the following agreement levels for each of the system quality measures:

System reliability 7

Response time 7

Ease of use 5

Ease of learning 5

Convenience of access 5

Flexibility of system 7

Integration of systems 7

Perceived usefulness 7

Usefulness of specific functions 5

Respondent4 marked nothing and wrote in nothing for 'Other **system quality** factors.'

For question 11, Respondent4 marked '5' to indicate his agreement level that his organization measures the quality of the information system(s) output it provides (information quality). Respondent4 marked the following agreement levels for each of the information quality measures:

Accuracy   5

Currency   5

Timeliness   5

Reliability   5

Understandability   5

Relevance to decisions   5

Completeness   5

Perceived usefulness   5

Comparability   5

Respondent4 marked nothing for other information quality factors and wrote in nothing.

For question 12, Respondent4 marked '5' to indicate his agreement level that his organization measures the extent of use of the information system(s) it provides. Subsequently, Respondent4 marked the following agreement levels for each of the information use measures:

Frequency of use   5

Percentage of time used   5

Use versus nonuse   5

Number of features used   5

Extent of use   5

Regularity of use	3
Voluntariness of use	5
Use at anticipated level	5
Motivation to use	5

Respondent4 marked nothing for other **information use** factors and wrote in nothing.

For questions 13, 14, and 15, Respondent4 marked '0' to indicate that his organization does not measure or that he does not know if his organization measures the user response to the use of the information system(s) it provides (user satisfaction), the individual impact, and the workgroup impact and appropriately marked nothing for each of the measures listed and marked nothing for other factors and wrote in nothing.

For question 16, Respondent4 marked '5' to indicate his agreement level that his organization measures the effect of the output of an information system on organizational performance (organizational impact). Respondent4 marked the following agreement levels for each of the organizational impact measures:

Return on assets (ROA)	blank
Return on investment (ROI)	5
Marketing achievements	blank
Innovations	blank
Market share	blank
Stock price	blank
Cost-benefit ratio	blank
Cost reductions	5
Productivity	6

Economic value-added (EVA)   blank

Respondent4 marked nothing for other organizational impact factors and wrote in

nothing. Finally, Respondent4 did not include any other materials or comments with

his/her completed survey.

Respondent 5

Respondent5, an anonymous student in the Executive MBA program of a large

metropolitan university, completed the survey and sent it to the researcher by mail in the

self-addressed envelope provided to the respondent. No contact information was provided

to allow for follow up questions. Respondent5 checked response 'C – Other:' and wrote

in "State organization (CO) Retail" then also checked 'E – State' under the

'Governmental organization:' category for question 1, even though the instructions

declare 'Mark only one.' Fortunately, the two responses are consistent. He/she marked

'Yes' for question 2 (works for a division of a parent organization), but did not write in a

value for neither the number of people that work in his/her division nor for the gross

revenues of his/her division. He/she marked 'S – Education' as the best description of the

industry of his division. For question 2d, Respondent5 marked the following numbers on

the 0-9 scale provided to indicate total disagreement (1) to total agreement (9) with each

of the following statements beginning with the phrase "My division is dependent on

information technology to:"

Introduce new products and/or services.	9
Create product and/or service differentiation.	0
Improve market access.	8
Establish competitive advantage.	9

Avoid competitive disadvantage   0

Respondent5 marked nothing and wrote in nothing for 'Other.'

For question 3, answering for his/her parent organization, Respondent5 wrote in
nothing for how many people work for his parent organization and nothing for the gross
revenues or income. Respondent5 marked 'S – Education' in response to question 3c the
industry of his parent organization and in question 3d marked the following values for the
each of the statements beginning with the phrase "My parent organization is dependent
on information technology to:"

Introduce new products and/or services.	9
Create product and/or service differentiation.	8
Improve market access.	9
Establish competitive advantage.	9
Avoid competitive disadvantage	0

Respondent5 marked nothing and wrote in nothing for 'Other.'

Starting in Section 2 of the survey, Respondent5 answered questions about
himself/herself. Respondent4 marked 'E – Manager of' and wrote in "information
services" for question 1 indicating his/her job title. He/she marked nothing for question 2
the primary job title of the person he/she reports to. For question 3, Respondent5 wrote in
"34" to indicate his/her age. He marked 'Male' to indicate his gender, wrote in "00" for
the number of years employed by his parent organization, wrote in "00" for the number
of years in his present position and wrote in "00" for the number of different positions he
has held within the organization. Respondent5 marked 'D – 2 year college degree (e.g.,
AA, AS)' for question 8. For the final question in Section 2 (number 9), Respondent5

marked that he is directly involved in assessing the IS area in his organization, that his

responsibility for IS assessment had been assigned or appointed, that he has had the

responsibility for IS assessment for "5" months at the parent level of his organization.

The final section of the survey, Section 3, contains questions about the

respondent's IS organization. Respondent5 marked 'C – Other' and wrote in "Area" in

question 1 to indicate that the remaining answers are about his area's IS organization. In

question 2, he filled in "$60,000" for the total operating budget of his IS organization.

Question 3 requests the percentage of the total operating budget that is paid to IS

outsourcers, consultants, and/or contract people to which Respondent5 wrote in "15"

percent. He wrote in 1 on question 4 to indicate the number of people who work for this

IS organization that are not outsourced employees, consultants, or contract people. And,

he wrote in "0" in question 5 for the number of people employed by his IS organization

that are full-time equivalent outsourced employees, consultants, or contracted. For

question 6, Respondent5 indicated that the CIO reports directly to the highest

manager/executive.

On question 7, Respondent5 indicated his level of agreement again using the 0-9

scale to the following statements that begin with the phrase 'This IS organization:'

Utilizes a comprehensive IS assessment system	5
Does extensive benchmarking to other IS organizations	1
Makes extensive use of the following methods to estimate the cost of IS development, maintenance, and conversion projects.	
(1) number of lines of code	5
(2) function points	5
(3) other _____	blank

On question 8, Respondent5 indicated by marking the '0' on the scale that either

his organization does not follow or he does not if his organization follows the software

development practices of the Software Engineering Institute's (SEI's) Configuration

Maturity Model (CMM) and marked nothing as the his organization's current level. With

question 9, the survey follows the IS assessment model. That is, starting with question 9

and continuing through question 16, each question asks the respondent to mark their

agreement level with the assertion that his organization measures that IS assessment

dimension. Following each IS assessment dimension assertion, the name of the

dimension is included in parentheses and highlighted in bold typeface to clearly reflect

that assertions link with the IS assessment model. Each dimension question is followed

by an assertion regarding each of the individual measures found in the literature for that

dimension. Each dimension measurement list is followed by an 'Other (insert IS

dimension) factors' statement followed by 4 blank lines to allow the respondent to write

in other measurements used by his/her organization.

For question 9, Respondent5 marked '6' to indicate his agreement level that his

organization measures the quality of the service it provides (service quality).

Respondent5 marked the following agreement levels for each of the service quality

indicators:

Tangibles: Physical facilities, equipment, and appearance of personnel   6

Reliability: Ability to perform the promised service dependably and accurately   6

Responsiveness: Willingness to help customers and provide prompt service   6

Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence   8

Empathy: Caring, individualized attention we provide our customers   7

Respondent5 marked nothing and wrote in nothing for other **service quality** factors.

For question 10, Respondent5 marked nothing, failing to indicate his agreement level that his organization measures the quality of the information processing system(s) it provides (system quality). Yet, Respondent5 marked the following agreement levels for each of the system quality measures:

System reliability	9
Response time	9
Ease of use	9
Ease of learning	9
Convenience of access	9
Flexibility of system	9
Integration of systems	9
Perceived usefulness	9
Usefulness of specific functions	9

Respondent5 marked nothing and wrote in nothing for other **system quality** factors.

For question 11, Respondent5 again marked nothing, failing to indicate his agreement level that his organization measures the quality of the information system(s) output it provides (information quality). Yet, Respondent5 marked the following agreement levels for each of the information quality measures:

Accuracy	9
Currency	9
Timeliness	9
Reliability	9

Understandability	9
Relevance to decisions	9
Completeness	9
Perceived usefulness	9
Comparability	9

Respondent5 marked nothing and wrote in nothing for other **information quality** factors.

For question 12, Respondent5 once again marked nothing, failing to indicate his agreement level that his organization measures the extent of use of the information system(s) it provides. Yet, Respondent5 marked the following agreement levels for each of the information use measures:

Frequency of use	7
Percentage of time used	8
Use versus nonuse	7
Number of features used	8
Extent of use	9
Regularity of use	9
Voluntariness of use	9
Use at anticipated level	9
Motivation to use	9

Respondent5 marked nothing for other **information use** factors and wrote in nothing.

For question 13, Respondent5 again marked nothing, failing to indicate his agreement level that his organization measures the user response to the use of the output

of an information system (user satisfaction). Respondent5 marked the following

agreement levels for each of the user satisfaction measures:

User satisfaction (39 items (Bailey & Pearson, 1983))	7
User information satisfaction (UIS, 13 items)	7
User satisfaction (other)	8
User enjoyment	5
User delight	4
Overall satisfaction	8
User dissatisfaction	8
User complaints	8
Decision-making satisfaction	8
System specific satisfaction	8

Respondent5 marked nothing for other **user satisfaction** factors and wrote in nothing.

For question 14, Respondent5 again marked nothing, failing to indicate if his

organization currently measures the effect of the output of an information system on

individual performance (individual impact). Yet, Respondent5 marked the following

agreement levels for each of the individual impact measures:

Quality of decisions	6
Time to make a decision	7
Time to complete a task	6
Decision confidence	5
Number of (decision-making) alternatives considered	7
Amount of (decision-making) data considered	7

Overall benefit/worth to the user   7

User productivity improvement   7

User communication improvement   7

Respondent5 marked nothing for other **individual impact** factors and wrote in nothing.

For question 15, Respondent5 marked nothing, failing to indicate if his
organization currently measures the effect of the output of an information system on
workgroup performance (workgroup impact). Yet, Respondent5 marked the following
agreement levels for each of the organizational impact measures:

Participation level   8

Meeting frequency   7

Meeting quality   7

Communication quality   7

Problem solution quality   7

Team productivity   8

Meeting equity   8

Decision quality   7

Decision efficiency   blank

Respondent5 marked nothing for other **workgroup impact** factors and wrote in nothing.

For question 16, Respondent5 again marked nothing, failing to indicate if his
organization currently measures the effect of the output of an information system on
organizational performance (organizational impact). Yet, Respondent5 marked the
following agreement levels for each of the organizational impact measures:

Return on assets (ROA)   0

Return on investment (ROI)	0
Marketing achievements	6
Innovations	6
Market share	0
Stock price	0
Cost-benefit ratio	0
Cost reductions	0
Productivity	0
Economic value-added (EVA)	0

Respondent5 marked nothing for other **organizational impact** factors and wrote in nothing. Finally, Respondent5 did not include any other materials or comments with his completed survey.

Respondent 6

Respondent6 did not complete the survey. But, he/she reviewed the survey and provided comments and suggestions to the researcher by mail in the self-addressed envelope provided to the respondent. Respondent6 provided a brief background statement, including education level (MS), years with current organization (15) as a member of the "IT management team… reporting directly to the head of the IT organization for most of those 15 years." Respondent6 suggested that the term information systems (IS) is dated and that the broader concept information technology (IT) might be more appropriate. IT, IS, and even MIS (management information services) have been and continue to be used by various organizations to refer to the area, department, division, or organization that is responsible for computer systems,

information processing, telecommunications, etc., for the larger organization (IT, 2003). Respondent6 also suggests that the contingency theory should be enlarged to include the "geographic reach of the IT organization," since many companies are "becoming global, not only in their reach, but in their business processes," or that the cover letter should state that I am interested in only North America or the U.S.A. This is an excellent suggestion that should be tested, but since it has not previously appeared in literature as an important contingency variable, no change will be made to this study's instrument.

Before making specific comments and suggestions on individual survey questions, Respondent6 stated "the questions are generally clear (except where noted below) and should be fairly straight forward to answer." Commenting on Section 1: questions 2a and 3a, Respondent6 suggests asking about full-time equivalents (FTEs) since the difference between full-time employees and FTEs "can be quite significant." Based on feedback and comments from the other subject matter experts (SMEs), I decided asking "how many people" would be easier and clearer for the majority of respondents to answer than asking "how many FTE." Also, since the anticipated coding for analysis would place organizations into groups of large size (e.g., <100, 100-500, 500-1500, 1500-5000, etc.) similar to that reported by Kappelman and Keeling (1997), the need for small granularity was not warranted. Commenting on Section 1: questions 2b and 3b, Respondent6 suggests that the question is not specific and that asking for one or the other of gross revenue or income is not useful when we are unable to differentiate which is being provided. Based on the results of Kappelman's year 2000 study (Kappelman, 1997), nearly 300 respondents were able to answer the question appropriately. Whether the respondent provides gross revenue or income is less important

than the relative size of the amount and that the respondent can answer the question. The survey is already too long, and adding a second question to both of these questions (2b & 3b) to differentiate between revenue and income would be counter-productive. Commenting on Section 2: question 9c, Respondent6 makes an excellent point that the IS assessment project may not be a project at all, but rather an ongoing assessment activity, or IS assessment process. I will modify the survey to add "or process" following "project" in question 9c, Section 2.

<p style="text-align:center">Respondent 7</p>

Respondent7 also did not complete the survey, but he reviewed and evaluated the survey and provided written comments on the survey questions. Respondent7 was an employee of a large consulting firm and was contacted for comments by the ISRC representative of that firm. He was a senior manager in the firm with greater than 15 years of experience in IT. Commenting on Section 1: question 1, Respondent7 suggested replacing "Profit-making" with "For-profit" in the heading for the first group of parent organization descriptions. These terms seem to be synonymous, and no other SME or respondent suggested a similar change. Therefore, no change will be made. Commenting on question 2c and 3c, Respondent7 suggested adding Telecommunications to the list of industry descriptions. I will add it to the list in both questions.

Commenting on questions 2d and 3d (Section 1), Respondent7 suggested adding another phrase to the list of choices, namely, "Establish new channels for customer access." Since the purpose of this question is to gage the information intensity of products and/or services, Respondent7's suggestion fits the purpose and captures an important component of information intensity in modern organizations. Thus, I will add

the phrase "Establish new channels for customer access" as choice 6 in questions 2d and 3d of Section 1. Commenting on Section 3, question 8, Respondent7 suggests an alternative wording for the question by replacing "aspires to" with "evaluates its performance using." The suggested wording appears to improve the understandability of the question and will be changed.

<div align="center">Respondent 8</div>

Respondent8 also did not complete the survey, but he reviewed and evaluated the survey and provided written comments on the survey questions. Respondent8 was an employee of the same large consulting firm as Respondent7 and was contacted for comments by the ISRC representative of that firm. He was a manager in the firm with greater than 12 years of experience in IT. Respondent8 suggests that the length of the survey will be an obstacle to getting CIOs to respond and that the amount of the "up front information" requested should be reduced. He suggests that some of this information may be acquired from another source. If the survey is used in an interview (phone or in-person), a targeted mailing, or a case study where anonymity is not promised or expected, this may be feasible.

<div align="center">Respondent 9</div>

Respondent9 also did not complete the survey, but he reviewed and evaluated the survey and provided written comments on the survey questions. Respondent9 was an employee of the same large consulting firm as Respondent7 and was contacted for comments by the ISRC representative of that firm. He was a senior manager in the firm with greater than 15 years of experience in IT and has worked with many "leading edge" IT organizations on "ways to measure and assess IT organizations." Respondent9 also

worked as the director of an "IT measurement system used to collect assessment data for" a large, Fortune 100, computer systems and services supplier's worldwide IT organization (while working for the CIO of that organization). Respondent9 suggests that "overall, the type of data asked for was what I expected." Yet, he goes on to discuss several assessment areas that he suggests might need more coverage. Respondent9 also echoed the comment made by Respondent6 that many organizations will have an ongoing process of IS assessment rather than just one-time IS assessment projects, giving added weight to the decision to modify question 9c, Section 2, as described above. Commenting on question 16 in Section 3, Respondent9 suggested adding other measures such as net present value (NPV), internal rate of return (IRR), and payback period. Since respondents are more likely to respond with agreement levels for measures listed than they are for measures not listed, i.e., measures that they must write in, I will add these to the list of measures in question 16, section 3. Respondent9 also suggested other areas that he has "seen measures in and that might be asked about are technology currency, process maturity and compliance with standards, and defect/operational fault measures." Since these have not yet appeared regularly in the IS literature and are measures that an organization with a mature IS assessment process might include in their assessment system (very few such organizations), these potential measures will be noted and considered for inclusion in future versions of the instrument.

Results

The first research question "Q_1: Is the IS assessment framework comprehensive and complete?" was confirmed by the extensive literature review and comments by the SMEs. All measures found or suggested were able to be incorporated into the IS

assessment framework. Research question 2 "Q_2: Does the IS assessment framework exhibit high content validity to practitioners (IS managers)?" was also confirmed by the extensive panel of SMEs and practicing IS managers. Based on the preceding analyses of each respondent's suggestions, updates to the survey instrument are summarized and revealed. In Section 1 questions 2c and 3c were modified to include choice "(V) Telecommunications" and move "Other" down to choice "(W)." Questions 2d and 3d were modified to add "Establish new channels for customer access." In Section 3 question 8 and 8a were modified to replace "aspires to" with "evaluates its performance using." Finally, in question 16, "Net present value (NPV)," "Internal rate of return (IRR)," and "Payback period" were added as measures 11, 12, and 13, respectively.

CHAPTER 6

CONCLUSIONS, LIMITATIONS, DISCUSSION

The progress toward the development of a comprehensive framework for IS

assessment is significant, yet much work remains to be done. What are the dimensions of

IS success that should be assessed? The dimensions critical to the success of the IS

function are service quality, system quality, information quality, use, user satisfaction,

individual impact, work group impact, and organizational impact. What are the measures

for assessing the performance of the IS function in each dimension? This work provides

everything needed to create a theoretically comprehensive, IS assessment systems. The

existing models of IS success were updated to include the emerging IS success

dimensions of service quality and work group impact and provide a comprehensive

method for organizing the various measures of IS success. In addition, many new

measures from recent research were presented to supplement the lists supplied by

previous research. To help answer the question of what dimensions and measures are

appropriate, all of the IS success dimensions and measures were placed in the context of

the organization and environment and the important variables to consider in these

contexts were listed, providing the start of the development of a contingency theory for

IS assessment. Given the small sample of respondents to the survey, no conclusions are

made as to which dimensions and measures are appropriate for each case. However, by

providing an extensive list of measures appropriate to assess each dimension and by

listing important contingency variables to consider, the practicing IS manager is provided

a framework for consideration of appropriate dimensions to assess and lists of measures for each dimension to choose from. Without this framework, important IS success dimensions may be overlooked and thus no or an inappropriate assessment performed.

The theoretical basis for selecting the appropriate dimensions and measures has yet to be developed and requires empirical research but practicing IS managers can use their experience and knowledge of their own organization to select the dimensions and measures they deem appropriate. How should the IS manager select the appropriate IS success dimensions and measures for each given their organizational and environmental context? How should the dimensions and measures be combined? What is working in practice in successful organizations? Research studies to answer these questions should be both quantitative and qualitative (Kaplan & Duchon, 1988; Orlikowski & Baroudi, 1991); to capture the broad, cross-sectional applications of IS assessment systems and the in-depth, complex nature of the subject. Cross-sectional studies might include Delphi groups or large-scale surveys of IS managers to further confirm that these are the right IS success dimensions and how these or other dimensions are being assessed and what measures are being used. Such data could then be examined to determine what organizational and environmental contexts and groups of dimensions and measures actually seem to work best. These studies would be complemented by the use of in-depth interviews and content analysis of organizational documents to learn the details of IS assessment system implementations. Methods to increase survey response rate will be necessary. Some have suggested that appropriate follow up to surveys is sufficient to increase response rates to acceptable levels (Paxson, Dillman, & Tarnai, 1995). This researcher's experience found even with 2 or more follow up phone calls; the response

rate can still be unacceptable. Given the length of this survey, the response rate to a

mailed survey may always be low, requiring the use of interviews, observations, and

content analysis of organization forms, policies, and procedures to gather the data.

Another possible reason for the low response rate is that the productivity paradox no

longer exists (Brynjolfsson & Hitt, 1996; Brynjolfsson & Hitt, 1998; Stiroh, 2001) and,

therefore, activities directed at addressing the productivity paradox do not seem a

worthwhile use of an executive's scarce time. In fact, IS/IT assessment is no longer

included in the top ten "hot" issues for IS executives (Kanter, 2003); another recent study

placed IS assessment at number 11 of 24 key issues (Gottschalk, 2001). Alternatively,

because the study group of Brynjolfsson and Hitt (1996) was only large publicly-traded

firms, possibly smaller organizations are still struggling with demonstrating the benefits

of IT to their organizations. Most output measures still primarily deal with cost savings

and do not adequately measure the value of many of the benefits of IT (Brynjolfsson &

Hitt, 1996). Nevertheless, with the foundation supplied by (1) the model and contingency

theory introduced here, plus (2) the addition of a new survey instrument (Appendix E)

that has been tested for content validity with IS SMEs and IS practitioners, that can be

used in whole or in part by other IS assessment researchers for further research or by IS

executives to choose appropriate IS success dimensions and measures, plus (3) a database

(library) of 685 bibliographic resources collected using the EndNote® bibliographic

software available from ISI ResearchSoft (www.endnote.com) from both IS academic

research and from IS practice made available to IS practice via the ISWorld Net

(www.isworld.org) at the Endnote® Resources page on ISWorld

(www.isworld.org/endnote/index.asp), a theory for IS assessment is attainable. Such a

theory has the potential to contribute to the quality and productivity of the IS function

and the larger organization by providing feedback to manage and improve the IS function

to better meet the needs of the organization.

APPENDIX A

TERM DEFINITIONS

CEO: Chief Executive Officer: The highest-level, executive manager of the organization, sometimes also given the title Chairman of the Board or President.

CIO: Chief Information Officer: The highest-level manager of the information systems function. Sometimes this position is an official title for the executive IS manager and is noted on organizational charts and official correspondence. Often though, it is not used by organizations and the title is then given unofficially to the senior IS executive. The CIO may report to the CEO or to the CFO, or chief financial officer, or possibly some other senior executive. Where the CIO reports is often considered an indication of the strategic value placed on IT by that organization.

IS: Information systems: "An *information system* is an organized collection of computer hardware components, computer software, application programs, data, and operational procedures. It is specifically configured and managed to support the operations, decision-making, and planning functions of an organization" (Katzan, 1980, p. 24). It can also represent the overall IS function in an organization, or a specific system or application program, or certain configurations of technology. "It is important to keep in mind what information systems do: they provide information to support the decision making and operations of organizations" (Wetherbe, 1983, p. 28).

IS assessment: The measurement of the effectiveness of the IS function (see 'IS effectiveness' below). A comprehensive, IS assessment system includes a framework describing the dimensions or activities of the IS function being measured, a model depicting the relationships of the dimensions, and a list of measures used to assess the performance of the IS function in each dimension. An

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IS assessment system has multiple purposes: 1. It should provide information to demonstrate the contribution of the IS function to the overall performance of the organization; 2. It should provide the IS manager with information to do the job of management; 3. It should encourage desired behavior of all employees involved; and so on.

IS effectiveness: "the contribution of the overall IS in an organization to that organization's performance" (Beise, 1989, p. 10).

IS function: The organization or collection of groups or units where information, people, and technology are located to serve the information-processing and information-delivery needs of the corporation. Function does not imply centralized. Often, the information function will be primarily centralized, but not necessarily. Even when decentralized, the IS manager will usually still have some responsibility for the people and technology distributed among the units. Frequently, IS manager and IS executive are used synonymously referring to the individual with overall responsibility for managing the corporate IS resources or assets (also called Chief Information Officer (CIO)).

IT: Information technology: "Information technology is the means, or vehicle, used to process, transmit, manipulate, analyze, and exploit data and information. In the broadest sense, information technology encompasses all computer- and telecommunications-based capabilities currently in place or proposed for development, including databases and custom or off-the-shelf software, all components and systems that can be assembled to provide business applications" (Gibson & Jackson, 1987, p. 3).

APPENDIX B

ORIGINAL SURVEY DRAFT (VERSION 1)

APPENDIX B - SURVEY QUESTIONS (sample only)

IS executive: For each of the following IS measures, please note by circling yes or no if that measure is used by your organization. For those measures actually used by your organization, please denote by circling a number (1-low, 7-high) the value you place on the use of that measure. Please use the space provided to list other measures you use that are not in the list and denote each measures value to you.

		Used?	Value
Measures of System Quality		------	-------------
1.	System reliability	yes no	1 2 3 4 5 6 7
2.	System response time	yes no	1 2 3 4 5 6 7
3.	Ease of use	yes no	1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
Measures of Information Quality			
4.	Report accuracy	yes no	1 2 3 4 5 6 7
5.	Report timeliness	yes no	1 2 3 4 5 6 7
6.	Report usefulness	yes no	1 2 3 4 5 6 7
7.	Information reliability	yes no	1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
Measures of Information System Use			
8.	Frequency of use	yes no	1 2 3 4 5 6 7
9.	Frequency of work requests	yes no	1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
Measures of User Satisfaction			
10.	Overall satisfaction	yes no	1 2 3 4 5 6 7
11.	Decision-making satisfaction	yes no	1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
	_____		1 2 3 4 5 6 7
Measures of Individual Impact			
12.	Productivity improvement	yes no	1 2 3 4 5 6 7
13.	Decision accuracy	yes no	1 2 3 4 5 6 7
14.	Decision confidence	yes no	1 2 3 4 5 6 7

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15. Time to decision or problem solved   yes no   1 2 3 4 5 6 7

    _____   1 2 3 4 5 6 7

    _____   1 2 3 4 5 6 7

    _____   1 2 3 4 5 6 7

    _____   1 2 3 4 5 6 7

Measures of Organizational Impact

16. Profit increases attributable to IS   yes no   1 2 3 4 5 6 7

17. Return on investment (ROI)   yes no   1 2 3 4 5 6 7

18. Budget performance   yes no   1 2 3 4 5 6 7

    _____   1 2 3 4 5 6 7

    _____   1 2 3 4 5 6 7

    _____   1 2 3 4 5 6 7

19. Is the organization ISO 9000 registered, seeking registration, or in the process of preparing for registration?

20. Has the organization applied for or won the Malcolm Baldridge National Quality Award, or any regional, state, or local quality award?

21. Degree of top management awareness of and support of information systems activities, goals, and objectives?

Demographics:

d1. Organization type: Public Private
d2. Organization type: (select from list)
d3. Organization size: Number of Employees (select range)
                             Annual Revenue or Sales (select range)
d5. Organization age: (select range)
d6. IS function age*: (select range)
etc. (examples given above; actual questions will be patterned from previous research)

* Number of years the organization has made use of information systems in support of organizational objectives (alternatively, number of years the IS function has existed).

Note: This is still very preliminary and incomplete. We need to add frequency of assessment, among other things. As stated previously, relevant, previously-tested, instruments will be used to develop this instrument in addition to pilot-testing it using Texas firms.

DRAFT

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APPENDIX C

ISRC COVER LETTER AND SURVEY INSTRUMENT

Computer Information Systems Department
University of Southern Colorado
2200 Bonforte Blvd
Pueblo, CO 81001-4901

December 10, 1997

ISRC Board Members
University of North Texas
Denton, TX 76203

Dear ISRC Board Members:
Subject: IS Assessment Research Project (funded by the ISRC)

Thank you for granting me the kindness of a few minutes of your valuable time. In 1995, the ISRC funded a project whose purpose was to extend existing IS productivity measures. Since that time, we have published several research papers documenting the assessment model proposed from the research and practitioner·literature. Based on that research, we have also developed a survey instrument to begin the task of documenting IS assessment practice. The survey instrument is in its fifth revision. Reviewers include my doctoral advisory committee, including three separate reviews by this project's principal co-investigators, Victor Prybutok and Leon Kappelman; and two expert IS researchers and former practitioners. We are now asking for your help.

To further verify the validity and reliability of the survey instrument, we are asking for your participation in a pilot study. We need 3 to 5 volunteers to complete the survey, provide comments and feedback on the content and questions, and agree to a phone call to confirm our understanding of your comments. If substantial disagreement occurs in this first round, we will provide you with the anonymous comments from all volunteers and ask that you assist in reaching consensus, meaning that you agree to comment on the modified survey content and questions and to be available for phone confirmation. We estimate the time commitment for your involvement to range from a minimum of 30-45 minutes to a maximum of 90-120 minutes over the next month. Will you help us make this vital research the best it can possibly be?

If so, please take the survey; complete it; provide comments on any questions in the margins or on the reverse side of the page; and provide feedback on the appropriateness and understandability of the content and the instructions. If you have time during a meeting break today to complete the survey and provide comments, please do so and return your survey and contact form to Dr. Becker or Dr. Huff. Otherwise, a self-addressed, stamped envelope is provided for your use. Please complete the survey and return it at your earliest convenience. Please leave your contact form with Drs. Becker or Huff so that I will know of your commitment. Thank you.

We will be targeting chief information officers (CIOs), information executives, or anyone directly involved with IS assessment in their organization. If you do not fall in one of these categories and are willing to assist us with securing the involvement of the appropriate individual in your organization, please note that on the response form and return it to Dr. Becker.

Again, thank you for your time and consideration. If you have any questions, please contact me using the mode most convenient for you.

Respectfully,

Barry L. Myers
719-549-2844
719-549-2519 (fax)
bmyers@uscolo.edu

Enclosures (2)

cc: Victor Prybutok
         Leon Kappelman

IS Assessment Project: Contact Information Form

I am willing to help you with your pilot study. I understand that my involvement will consist of 1) completing the survey instrument, 2) providing comments and feedback on the content and questions, including instructions, 3) making myself available for a short phone call to confirm my responses, and if necessary 4) completing steps 2 & 3 a second or third time to reach consensus.

Name: _____ (or attach a business card)

Title: _____

Organization: _____

Mailing Address: _____

_____

_____

Phone Number: _____

Fax Number: _____

Email: _____

___ If you do not fit our target audience for the survey and are willing to help us secure the involvement of the appropriate person in your organization, please check the line to the left, fill in your information above. If I do not near from you in the next week, I will contact you for an update on your progress. Thank you for your assistance.

Please return this form immediately to Drs. Becker or Huff. Thank you.

Barry L. Myers
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University of Southern Colorado
2200 Bonforte Blvd
Pueblo, CO 81001-4901
719-549-2844
719-549-2519 fax
bmyers@uscolo.edu

University of Southern Colorado

Computer Information Systems

ISRC IS Assessment Study: Instructions

1. Your responses will be kept anonymous. Only the University of Southern Colorado and the University of North Texas researchers will see individual forms. Otherwise, only summary information will be reported.

2. When finished, please put this questionnaire in the pre-addressed, pre-paid business reply envelope and mail it. THANK YOU FOR YOUR PARTICIPATION!

3. There are no right or wrong answers. We just need your honest opinion.

4. The questions are grouped into 3 sections concerning your (1) organization, (2) yourself, and (3) the Information Systems (IS) group in your organization and the IS assessment methods used in your organization.

5. Sometimes, a scale of 0 to 9 is provided to record your answer. Please mark the ONE answer that best describes your response to the statement provided. Mark 0 if the question is not applicable (NA) or you don't know the answer. Think of the scale from 1 to 9 as a continuum from total disagreement (TD) to total agreement (TA) with the statement provided. For a neutral (N) response, mark 5.

NA =	0	=	This question is <u>not applicable</u> or I <u>don't know</u> the answer.
TD =	1	=	<u>totally disagree</u>
	2	=	strongly disagree
	3	=	disagree
	4	=	disagree somewhat
N =	5	=	<u>neutral</u> (neither agree nor disagree)
	6	=	somewhat agree
	7	=	agree
	8	=	strongly agree
TA =	9	=	<u>totally agree</u>

6. Examples: Please complete the survey as follows:

    a. Clearly mark your answers with a dark pen or marker using the scale of 0 to 9.

    This IS organization utilizes a comprehensive IS assessment system.

    NA TD   N   TA
    (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

    b. Please fill in your answer in any blank spaces provided.

    How many years has your company been in operation? (Please write in your answer.)

              ☐ ☐ ☐ **years**

    Please mark the <u>one</u> answer that best describes your parent organization.

    ☐ **(A)** Publicly-traded company
    ☐ **(B)** Privately-held company
    ☒ **(C)** Other: _Non - Profit - Religious_

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7. Please use the following definitions when referring to the "levels" or "subunits" of your organization:

Area: The functional group within which you work: For example, the Information Systems Department.

Division: The division level is not present in all organizations. Divisions are distinct, stand-alone units. For example, Chevrolet is a strategic business unit within the larger company General Motors (GM). In governments (local, state, and federal), these are often called "departments" or "agencies," such as the Commerce Department is to the US Government.

Parent: The parent organization is the larger entity of which your division is a part. For example, the US Government is the parent of the Commerce Department and GM is the parent of Chevrolet. When the divisional subunit is not present, there is only the parent and its areas.

8. Your time and cooperation are sincerely appreciated. If you have any questions or concerns or comments about this survey, or would like any additional information, please contact:

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9. This project has been reviewed and approved by the University of North Texas Committee for the Protection of Human Subjects (940-565-3940) who asked us to tell you that you may withdraw from the experiment at any time without penalty, prejudice, or loss of benefits.

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Section 1: *Please answer the following questions about the organization in which you work:*

1. Please mark the answer that best describes your parent organization. (Mark only <u>one</u>.)

> *Profit-making corporation:*
>   ☐ (A) Publicly-traded company
>   ☐ (B) Privately-held company
>   ☐ (C) Other: _____
> *Governmental organization:*
>   ☐ (D) Federal
>   ☐ (E) State
>   ☐ (F) County
>   ☐ (G) Municipal
>   ☐ (H) Other: _____
> *Not-for-profit organization:*
>   ☐ (I) Educational
>   ☐ (J) Religious
>   ☐ (K) Philanthropic Foundation
>   ☐ (L) Charitable Institution
>   ☐ (M) Other: _____
> ☐ *(N) Other:* _____

2. Do you work for a <u>division of a parent organization</u>?
    ☐ No. If no, please go to question number 3.
    ☐ Yes. If yes, please answer the following for your division

    2a. How many **people** work in your division (NOT the functional area in which you work). (Please write in your answer.)

            ☐☐☐,☐☐☐,☐☐☐ people

    2b. What were the **gross revenues or income** of your division in the last fiscal year? (Please write in your answer in US dollars.)

            ☐,☐☐☐,☐☐☐,☐☐☐,☐☐☐.00 in US dollars

    2c. Please mark the ONE answer that best describes the industry of your division.

☐ (A) Agriculture	☐ (L) Insurance
☐ (B) Mining	☐ (M) Real Estate
☐ (C) Construction	☐ (N) Hotels and Leisure
☐ (D) Printing, Publishing	☐ (O) Business Services
☐ (E) Transportation	☐ (P) Entertainment
☐ (F) Consumer Goods Manufacturing	☐ (Q) Health
☐ (G) Capital Goods Manufacturing	☐ (R) Legal
☐ (H) Utilities	☐ (S) Education
☐ (I) Retail	☐ (T) Government
☐ (J) Food Services	☐ (U) Military
☐ (K) Banking, Securities, Investments	☐ (V) Other _____

Question 2 continues with 2d on the following page (answering for your division).

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Instructions: Please mark the ONE answer that best describes your response to each of the following statements. Mark 0 if the question is not applicable (NA) or you don't know the answer. Think of the scale from 1 to 9 as a continuum from total disagreement (TD) to total agreement (TA) with the statement provided. For a neutral (N) response, mark 5. Refer to page 1 (item 5) for a complete description of the scale.

NA = 0 = This question is <u>not applicable</u> or I <u>don't know</u> the answer
TD = 1 = <u>totally disagree</u>
N = 5 = <u>neutral</u> (neither agree nor disagree)
TA = 9 = <u>totally agree</u>

2d. My division is dependent on information technology to:

	NA	TD				N				TA
2d1. Introduce new products and/or services.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
2d2. Create product and/or service differentiation.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
2d3. Improve market access.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
2d4. Establish competitive advantage.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
2d5. Avoid competitive disadvantage.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
2d6. Other: _____	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)

3. Please answer the following for your <u>parent organization</u>.

3a. How many **people** work for your parent organization? (Please write in your answer.)

☐☐☐,☐☐☐,☐☐☐ people

3b. What were the **gross revenues or income** of your parent organization in the last fiscal year?
(Please write in your answer in US dollars.)

☐,☐☐☐,☐☐☐,☐☐☐,☐☐☐.00 in US dollars

3c. Please mark the ONE answer that best describes the **industry** of your parent organization.

☐ (A) Agriculture
☐ (B) Mining
☐ (C) Construction
☐ (D) Printing, Publishing
☐ (E) Transportation
☐ (F) Consumer Goods Manufacturing
☐ (G) Capital Goods Manufacturing
☐ (H) Utilities
☐ (I) Retail
☐ (J) Food Services
☐ (K) Banking, Securities, Investments

☐ (L) Insurance
☐ (M) Real Estate
☐ (N) Hotels and Leisure
☐ (O) Business Services
☐ (P) Entertainment
☐ (Q) Health
☐ (R) Legal
☐ (S) Education
☐ (T) Government
☐ (U) Military
☐ (V) Other _____

Instructions: Please mark the ONE answer that best describes your response to each of the following statements. Mark 0 if the question is not applicable (NA) or you don't know the answer. Think of the scale from 1 to 9 as a continuum from total disagreement (TD) to total agreement (TA) with the statement provided. For a neutral (N) response, mark 5. Refer to page 1 (item 5) for a complete description of the scale.

3d. My parent organization is dependent on information technology to:

	NA	TD				N				TA
3d1. Introduce new products and/or services.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
3d2. Create product and/or service differentiation.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
3d3. Improve market access.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
3d4. Establish competitive advantage.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
3d5. Avoid competitive disadvantage.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)
2d6. Other: _____	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)

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Section 2: *Please answer the following __questions about yourself__:*

1. What is __your primary job title__? (Mark only __one__)

      ☐ **(A)** Chief Information Officer (CIO)
      ☐ **(B)** Vice President of _____
      ☐ **(C)** Member of the Board
      ☐ **(D)** Director of _____
      ☐ **(E)** Manager of _____
      ☐ **(F)** Other _____

2. What is the primary job title of the __person you report to__? (Mark only __one__)

      ☐ **(A)** Chairman of the Board
      ☐ **(B)** Chief Executive Officer (CEO)
      ☐ **(C)** Agency Director/Secretary/Administrator
      ☐ **(D)** Agency Deputy Director/Agency Under Secretary/Agency Deputy Administrator
      ☐ **(E)** Chief Information Officer (CIO)
      ☐ **(F)** Chief Operating Officer (COO)
      ☐ **(G)** Chief Financial Officer (CFO)
      ☐ **(H)** Controller
      ☐ **(I)** Head of Audit Committee
      ☐ **(J)** President
      ☐ **(K)** President of _____
      ☐ **(L)** Vice-president of _____
      ☐ **(M)** Member of the Board
      ☐ **(N)** Other _____

3. What is __your age__ in years? (Please write in your answer.)   ☐☐ years

4. What is your __gender__? (Mark only __one__)   ☐ Female   ☐ Male

5. __How many years__ have you been __with this parent organization__? (Please write in your answer.)
                                                                                        ☐☐ years

6. __How many years__ have you held __your present position__? (Please write in your answer.)
                                                                                        ☐☐ years

7. __How many different positions__ have you held __with this parent organization__? (Please write in your answer.)
                                                                                        ☐☐ positions

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8. How much <u>formal education</u> do you have? (Mark only <u>one</u>, denoting the highest educational level attained.)
- □ **(A)** Did not complete high school.
- □ **(B)** High school graduate.
- □ **(C)** Some college but no degree.
- □ **(D)** 2 year college degree (e.g., AA, AS).
- □ **(E)** 4 year college degree (e.g., BA, BS, BBA)
- □ **(F)** Some graduate school but no degree.
- □ **(G)** A Master's degree (e.g., MBA, MS, MA).
- □ **(H)** A Doctoral degree (e.g., Ph.D., MD)
- □ **(I)** Other _____

9. Are you <u>directly involved in assessing the IS area</u> in your organization?
- □ No.   If no, please go to **Section 3** (next page).
- □ Yes. If yes, please answer the following questions:

9a. How were you assigned responsibility for IS assessment? (Mark only <u>one</u>)
- □ **(A)** Volunteered
- □ **(B)** Assigned or appointed
- □ **(C)** Don't know
- □ **(D)** Other _____

9b. For <u>how many</u> **months** have you had responsibility for or been directly involved in IS assessment? (Please write in your answer.)

□□□ months

9c. Is the IS assessment project in which you are directly involved at the parent or division level? (Mark <u>one</u>.)
- □ **(A)** Parent
- □ **(B)** Division
- □ **(C)** Other _____

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Section 3: Please answer the following questions about your Information Systems (IS) organization.

For all of the questions in this section, you may answer for the parent IS organization or the divisional IS organization depending upon the one you work for and/or the one with which you are most familiar. By "IS organization" we mean the functional group (or area) that manages the information assets of some larger organization. By "information assets" we mean the various applications, hardware, other software, networks, data, voice, video, and other assets typically managed by IS professionals working together in some functional unit (i.e., an IS organization).

1. My answers to all the following questions are about the IS organization of my _____. (Mark one.)

   □ (A)   Parent

   □ (B)   Division

   □ (C)   Other _____

2. What was the <u>total operating</u> **budget** of this IS organization during the last fiscal year? This includes all money spent providing information services – people, communications, hardware, software, maintenance, outsourcing contracts, and any other directly related items. (Please write in your answer in US dollars.)

   □□,□□□,□□□,□□□.00 in US dollars

3. What **percentage** of this total operating budget was paid <u>to IS outsourcers, consultants, and/or contract</u> people? (Please write in your answer.)

   □□□%

4. <u>How many **people** work for this IS organization</u>? (Please include all IS professionals and staff, as well as both direct and dotted line reports. Do <u>NOT include outsourced employees, consultants, or contract</u> people.) (Please write in your answer.)

   □□□,□□□ people

5. How many full-time equivalent outsourced employees, consultants, or contracted **people** are employed by this IS organization? (Please write in your answer.)

   □□□,□□□ people

6. How many **levels** below the highest manager/executive in your organization does the top information systems manager/executive (CIO) report? (Please mark just one.)

   □ (A)   CIO is highest manager/executive (0 levels)
   □ (B)   CIO reports directly to the highest manager/executive (1 level)
   □ (C)   CIO reports to someone who reports directly to the highest manager/executive (2 levels)
   □ (D)   3 levels
   □ (E)   4 levels
   □ (F)   5 or more levels

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Instructions: Please mark the ONE answer that best describes your response to each of the following statements. Mark 0 if the question is not applicable (NA) or you don't know the answer. Think of the scale from 1 to 9 as a continuum from total disagreement (TD) to total agreement (TA) with the statement provided. For a neutral (N) response, mark 5. Refer to page 1 (item 5) for a complete description of the scale.

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N = 5 = <u>neutral</u> (neither agree nor disagree)
TA = 9 = <u>totally agree</u>

7. This IS organization:

	NA	TD		N		TA

7a. utilizes a comprehensive IS assessment system.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

7b. does extensive benchmarking to other IS organizations.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

7c. makes extensive use of the following methods to estimate the cost of IS development, maintenance, and conversion projects.

(1) number of lines of code   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

(2) function points   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

(3) other _____   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

8. This IS organization aspires to the software development practices of the Software Engineering Institute's (SEI's) Configuration Maturity Model (CMM) (as per Watts Humphrey and Mark Paulk).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

8a. If your IS organization does aspire to SEI CMM practices, at what **level** would your IS organization be assessed? (Mark one)

☐ **(1)**   Initial (level 1)
☐ **(2)**   Repeatable (level 2)
☐ **(3)**   Defined (level 3)
☐ **(4)**   Managed (level 4)
☐ **(5)**   Optimizing (level 5)

9. This IS organization measures the quality of the service it provides (**service quality**).

	NA	TD		N		TA

(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

9a. To assess our **service quality**, we measure our customers perceptions of our:

9a1. Tangibles: Physical facilities, equipment, and appearance of person-nel.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

9a2. Reliability: Ability to perform the promised service dependably and accurately.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

9a3. Responsiveness: Willingness to help customers and provide prompt service.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

9a4. Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

9a5. Empathy: Caring, individualized attention we provide our customers.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

9b1. Other **service quality** factors (please describe).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

_____
_____
_____
_____

8

10. This IS organization measures the quality of the information processing system(s) it provides (**system quality**).

NA TD   N   TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

    10a. To assess our **system quality**, we measure:

        10a1. System reliability.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        10a2. Response time.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        10a3. Ease of use.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        10a4. Ease of learning.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        10a5. Convenience of access.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        10a6. Flexibility of system.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        10a7. Integration of systems.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        10a8. Perceived usefulness.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        10a9. Usefulness of specific functions.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

    10b. Other **system quality** factors (please describe)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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11. This IS organization measures the quality of the information system(s) output (**information quality**).

NA TD   N   TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

    11a. To assess our **information quality**, we measure:

        11a1. Accuracy.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        11a2. Currency.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        11a3. Timeliness.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        11a4. Reliability.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        11a5. Understandability.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        11a6. Relevance to decisions.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        11a7. Completeness.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        11a8. Perceived usefulness.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

        11a9. Comparability.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

    11b. Other **information quality** factors (please describe)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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12. This IS organization measures the extent of use (or user consumption of the output) of the information system(s) it provides (**information use**).

NA TD   N   TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

    12a. To assess **information use**, we measure:

        12a1. Frequency of use.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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12a2. Percentage of time used.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
12a3. Use versus nonuse.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
12a4. Number of features used.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
12a5. Extent of use.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
12a6. Regularity of use.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
12a7. Voluntariness of use.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
12a8. Use at anticipated level.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
12a9. Motivation to use.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
12b. Other **information use** factors (please describe)	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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13. This IS organization measures the user response to the use of the output of an information system (**user satisfaction**).

NA TD   N   TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a. To assess our **user satisfaction**, we measure:

13a1. User satisfaction (39 items, (Bailey & Pearson, 1983)).	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a2. User information satisfaction (UIS, 13 items)	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a3. User satisfaction (other).	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a4. User enjoyment.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a5. User delight.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a6. Overall satisfaction.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a7. User dissatisfaction.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a8. User complaints.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a9. Decision-making satisfaction.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13a10. System specific satisfaction	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
13b. Other **user satisfaction** factors (please describe)	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

_____

_____

_____

_____

14. This IS organization measures the effect of the output of an information system on the behavior of the user (**individual impact**).

NA TD   N   TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a. To assess the **individual impact**, we measure:

14a1. Quality of decisions.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
14a2. Time to make a decision.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
14a3. Time to complete a task.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
14a4. Decision confidence.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
14a5. Number of (decision-making) alternatives considered.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
14a6. Amount of (decision-making) data considered.	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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14a7. Overall benefit/worth to the user.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a8. User productivity improvement.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a9. User communication improvement   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14b. Other **individual impact** factors (please describe)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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15. This IS organization measures the effect of the output of an information system on the behavior of the team or workgroup (**workgroup impact**).

NA   TD   N   TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a. To assess the workgroup impact, we measure

15a1. Participation level.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a2. Meeting frequency.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a3. Meeting quality.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a4. Communication quality.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a5. Problem solution quality.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a6. Team productivity.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a7. Meeting equity.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a8. Decision quality.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a9. Decision efficiency.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15b. Other **workgroup impact** factors (please describe)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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16. This IS organization measures the effect of the output of an information system on organizational performance (**organizational impact**).

NA   TD   N   TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a. To assess our organizational impact, we measure:

16a1. Return on assets (ROA).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a2. Return on investment (ROI).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a3. Marketing achievements.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a4. Innovations.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a5. Market share.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a6. Stock price.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a7. Cost-benefit ratio.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a8. Cost reductions.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a9. Productivity.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a10. Economic value-added (EVA).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16b. Other **organizational impact** factors (please describe)	NA TD	N	TA
	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)		

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Thank you for your time. Please return this completed form immediately using the prepaid business reply envelope.

HELP WANTED: In the interests of helping all IS Managers succeed, if you have an assessment technique, tool, or other materials and are willing and able to share these with other IS Managers, please do so. We can and will facilitate such sharing, so if you would like to include something in the return envelope with this questionnaire or jot something down in the small space below, please do so now. Issues of particular interest are: (1) how to store, organize, manage, and use IS assessment data; (2) the decision rules you use to select IS dimensions for assessment, specific measures to use, and frequency of assessment; (3) tips and success stories for raising awareness and convincing management and users that IS assessment is important; and (4) standards you have established for IS performance.

If you are including materials in the return envelope or writing comments below, please indicate here.

☐ Yes, I'm including materials or comments

If you prefer, you may email materials or information to **bmyers@uscolo.edu** or mail them under separate cover to Barry Myers, CIS Dept., Univ. of Southern Colorado, 2200 Bonforte Blvd, Pueblo, CO 81001-4901.

If you would like to be credited by name or organization, please include that information below or on the documents you enclose. If you prefer anonymity, just mark out all identifying information on your documents. THANK YOU FOR YOUR COOPERATION -- WE'RE IN THIS TOGETHER.

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APPENDIX D

UNIVERSITY OF SOUTHERN COLORADO HUMAN SUBJECTS APPROVAL

MEMO

To: Barry L. Myers, Computer Information Systems
From: Joan Post-Gorden, Chair
            Human Subjects Protection Committee
Subject: Research Proposal: Development of a Comprehensive System and Contingency
            Theory for Information Systems (IS) Asessment
Date: March 12, 1998

The USC Human Subjects Protection Committee has reviewed your proposal and the informed
consent procedures. In our judgment the proposal listed above and its informed consent
procedures satisfy Federal guidelines (DHHS, 45CFR46) for safeguarding the right and welfare
of human subjects. We therefore endorse your proposal and wish you much success in pursuing
your research goals.

APPENDIX E

UPDATED IS ASSESSMENT SURVEY INSTRUMENT

IS Assessment Study: Instructions

1. Your responses will be kept anonymous. Only the researchers will see individual forms. Otherwise, only summary information will be reported.

2. When finished, please put this questionnaire in the pre-addressed, pre-paid business reply envelope and mail it. THANK YOU FOR YOUR PARTICIPATION!

3. There are no right or wrong answers. We just need your honest opinion.

4. The questions are grouped into 3 sections concerning your (1) organization, (2) yourself, and (3) the Information Systems (IS) group in your organization and the IS assessment methods used in your organization.

5. Sometimes, a scale of 0 to 9 is provided to record your answer. Please mark the ONE answer that best describes your response to the statement provided. Mark 0 if the question is not applicable (NA) or you don't know the answer. Think of the scale from 1 to 9 as a continuum from total disagreement (TD) to total agreement (TA) with the statement provided. For a neutral (N) response, mark 5.

NA =	0	=	This question is not applicable or I don't know the answer.
TD =	1	=	totally disagree
	2	=	strongly disagree
	3	=	disagree
	4	=	disagree somewhat
N =	5	=	neutral (neither agree nor disagree)
	6	=	somewhat agree
	7	=	agree
	8	=	strongly agree
TA =	9	=	totally agree

6. Examples: Please complete the survey as follows:

   a. Clearly mark your answers with a dark pen or marker using the scale of 0 to 9.

      This IS organization utilizes a comprehensive IS assessment system.

      NA TD   N   TA
      (0)   (1) (2) (3) (4) (5) (6) (7) (8) (9)

   b. Please fill in your answer in any blank spaces provided.

      How many years has your company been in operation? (Please write in your answer.)

      ☐☐☐ years

      Please mark the one answer that best describes your parent organization.

      ☐ (A) Publicly-traded company
      ☐ (B) Privately-held company
      ☐ (C) Other:

7. Please use the following definitions when referring to the "levels" or "subunits" of your organization:

Area: The functional group within which you work: For example, the Information Systems Department.

Division: The division level is not present in all organizations. Divisions are distinct, stand-alone units. For example, Chevrolet is a strategic business unit within the larger company General Motors (GM). In governments (local, state, and federal), these are often called "departments" or "agencies," such as the Commerce Department is to the US Government.

Parent: The parent organization is the larger entity of which your division is a part. For example, the US Government is the parent of the Commerce Department and GM is the parent of Chevrolet. When the divisional subunit is not present, there is only the parent and its areas.

8. Your time and cooperation are sincerely appreciated. If you have any questions or concerns or comments about this survey, or would like any additional information, please contact:

<div align="center">

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9. This project has been reviewed and approved by the University of North Texas Committee for the Protection of Human Subjects (940-565-3940) who asked us to tell you that you may withdraw from the experiment at any time without penalty, prejudice, or loss of benefits.

Section 1: Please answer the following questions about the organization in which you work:

1. Please mark the answer that best describes your parent organization. (Mark only <u>one</u>.)

    Profit-making corporation:
      ☐ (A) Publicly-traded company
      ☐ (B) Privately-held company
      ☐ (C) Other: _____

    Governmental organization:
      ☐ (D) Federal
      ☐ (E) State
      ☐ (F) County
      ☐ (G) Municipal
      ☐ (H) Other: _____

    Not-for-profit organization:
      ☐ (I) Educational
      ☐ (J) Religious
      ☐ (K) Philanthropic Foundation
      ☐ (L) Charitable Institution
      ☐ (M) Other: _____
    ☐ *(N) Other:* _____

2. Do you work for a <u>division of a parent organization</u>?
    ☐ No. If no, please go to question number 3.
    ☐ Yes. If yes, please answer the following for your division

  2a. How many **people** work in your division (NOT the functional area in which you work). (Please write in your answer.)

                    ☐☐☐,☐☐☐,☐☐☐ people

  2b. What were the **gross revenues or income** of your division in the last fiscal year? (Please write in your answer in US dollars.)

                 ☐,☐☐☐,☐☐☐,☐☐☐,☐☐☐.00 in US dollars

  2c. Please mark the ONE answer that best describes the industry of your division.

☐ (A) Agriculture	☐ (L) Insurance
☐ (B) Mining	☐ (M) Real Estate
☐ (C) Construction	☐ (N) Hotels and Leisure
☐ (D) Printing, Publishing	☐ (O) Business Services
☐ (E) Transportation	☐ (P) Entertainment
☐ (F) Consumer Goods Manufacturing	☐ (Q) Health
☐ (G) Capital Goods Manufacturing	☐ (R) Legal
☐ (H) Utilities	☐ (S) Education
☐ (I) Retail	☐ (T) Government
☐ (J) Food Services	☐ (U) Military
☐ (K) Banking, Securities, Investments	☐ (V) Telecommunications
	☐ (W) Other _____

Question 2 continues with 2d on the following page (answering for your division).

3

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Instructions: Please mark the ONE answer that best describes your response to each of the following statements. Mark 0 if the question is not applicable (NA) or you don't know the answer. Think of the scale from 1 to 9 as a continuum from total disagreement (TD) to total agreement (TA) with the statement provided. For a neutral (N) response, mark 5. Refer to page 1 (item 5) for a complete description of the scale.

NA = 0 = This question is not applicable or I don't know the answer
TD = 1 = totally disagree
N = 5 = neutral (neither agree nor disagree)
TA = 9 = totally agree

2d. My division is dependent on information technology to:

	NA	TD	N	TA
2d1. Introduce new products and/or services.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
2d2. Create product and/or service differentiation.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
2d3. Improve market access.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
2d4. Establish competitive advantage.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
2d5. Avoid competitive disadvantage.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
2d6. Establish new channels for customer access.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
2d7. Other: _____	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		

3. Please answer the following for your parent organization.

3a. How many **people** work for your parent organization? (Please write in your answer.)

☐☐☐,☐☐☐,☐☐☐ people

3b. What were the **gross revenues or income** of your parent organization in the last fiscal year? (Please write in your answer in US dollars.)

☐,☐☐☐,☐☐☐,☐☐☐,☐☐☐.00 in US dollars

3c. Please mark the ONE answer that best describes the **industry** of your parent organization.

☐ (A) Agriculture
☐ (B) Mining
☐ (C) Construction
☐ (D) Printing, Publishing
☐ (E) Transportation
☐ (F) Consumer Goods Manufacturing
☐ (G) Capital Goods Manufacturing
☐ (H) Utilities
☐ (I) Retail
☐ (J) Food Services
☐ (K) Banking, Securities, Investments

☐ (L) Insurance
☐ (M) Real Estate
☐ (N) Hotels and Leisure
☐ (O) Business Services
☐ (P) Entertainment
☐ (Q) Health
☐ (R) Legal
☐ (S) Education
☐ (T) Government
☐ (U) Military
☐ (V) Telecommunications
☐ (W) Other _____

Instructions: Please mark the ONE answer that best describes your response to each of the following statements. Mark 0 if the question is not applicable (NA) or you don't know the answer. Think of the scale from 1 to 9 as a continuum from total disagreement (TD) to total agreement (TA) with the statement provided. For a neutral (N) response, mark 5. Refer to page 1 (item 5) for a complete description of the scale.

3d. My parent organization is dependent on information technology to:

	NA	TD	N	TA
3d1. Introduce new products and/or services.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
3d2. Create product and/or service differentiation.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
3d3. Improve market access.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
3d4. Establish competitive advantage.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
3d5. Avoid competitive disadvantage.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
3d6. Establish new channels for customer access.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		
3d7. Other: _____	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)		

4

Section 2: Please answer the following _questions about yourself_:

1. What is _your primary job title_? (Mark only _one_)

    ☐ **(A)** Chief Information Officer (CIO)
    ☐ **(B)** Vice President of _____
    ☐ **(C)** Member of the Board
    ☐ **(D)** Director of _____
    ☐ **(E)** Manager of _____
    ☐ **(F)** Other _____

2. What is the primary job title of the _person you report to_? (Mark only _one_)

    ☐ **(A)** Chairman of the Board
    ☐ **(B)** Chief Executive Officer (CEO)
    ☐ **(C)** Agency Director/Secretary/Administrator
    ☐ **(D)** Agency Deputy Director/Agency Under Secretary/Agency Deputy Administrator
    ☐ **(E)** Chief Information Officer (CIO)
    ☐ **(F)** Chief Operating Officer (COO)
    ☐ **(G)** Chief Financial Officer (CFO)
    ☐ **(H)** Controller
    ☐ **(I)** Head of Audit Committee
    ☐ **(J)** President
    ☐ **(K)** President of _____
    ☐ **(L)** Vice-president of _____
    ☐ **(M)** Member of the Board
    ☐ **(N)** Other _____

3. What is _your age_ in years? (Please write in your answer.)　　　　☐☐ years

4. What is your _gender_? (Mark only _one_)　　　　☐ Female　☐ Male

5. _How many years_ have you been _with this parent organization_? (Please write in your answer.)
    ☐☐ years

6. _How many years_ have you held _your present position_? (Please write in your answer.)
    ☐☐ years

7. _How many different positions_ have you held _with this parent organization_? (Please write in your answer.)
    ☐☐ positions

5

8. How much <u>formal education</u> do you have? (Mark only <u>one</u>, denoting the highest educational level attained.)
- ☐ **(A)** Did not complete high school.
- ☐ **(B)** High school graduate.
- ☐ **(C)** Some college but no degree.
- ☐ **(D)** 2 year college degree (e.g., AA, AS).
- ☐ **(E)** 4 year college degree (e.g., BA, BS, BBA)
- ☐ **(F)** Some graduate school but no degree.
- ☐ **(G)** A Master's degree (e.g., MBA, MS, MA).
- ☐ **(H)** A Doctoral degree (e.g., Ph.D., MD)
- ☐ **(I)** Other _____

9. Are you <u>directly involved in assessing the IS area</u> in your organization?
- ☐ No.   If no, please go to **Section 3** (next page).
- ☐ Yes. If yes, please answer the following questions:

    9a. How were you assigned responsibility for IS assessment? (Mark only <u>one</u>)
    - ☐ **(A)**   Volunteered
    - ☐ **(B)**   Assigned or appointed
    - ☐ **(C)**   Don't know
    - ☐ **(D)**   Other _____

    9b. For <u>how many</u> **months** have you had responsibility for or been directly involved in IS assessment? (Please write in your answer.)

    ☐☐☐ months

    9c. Is the IS assessment project or process in which you are directly involved at the parent or division level? (Mark <u>one</u>.)
    - ☐ **(A)**   Parent
    - ☐ **(B)**   Division
    - ☐ **(C)**   Other _____

6

Section 3: Please answer the following questions about your Information Systems (IS) organization.

For all of the questions in this section, you may answer for the parent IS organization or the divisional IS organization depending upon the one you work for and/or the one with which you are most familiar. By "IS organization" we mean the functional group (or area) that manages the information assets of some larger organization. By "information assets" we mean the various applications, hardware, other software, networks, data, voice, video, and other assets typically managed by IS professionals working together in some functional unit (i.e., an IS organization).

1. My answers to all the following questions are about the IS organization of my _____. (Mark one.)

   ☐ (A)   Parent

   ☐ (B)   Division

   ☐ (C)   Other _____

2. What was the <u>total operating</u> **budget** of this IS organization during the last fiscal year? This includes all money spent providing information services – people, communications, hardware, software, maintenance, outsourcing contracts, and any other directly related items. (Please write in your answer in US dollars.)

   ☐☐,☐☐☐,☐☐☐,☐☐☐.00 in US dollars

3. What **percentage** of this total operating budget was paid <u>to IS outsourcers, consultants, and/or contract</u> people? (Please write in your answer.)

   ☐☐☐%

4. <u>How many **people** work for this IS organization</u>? (Please include all IS professionals and staff, as well as both direct and dotted line reports. Do <u>NOT include outsourced employees, consultants, or contract</u> people.) (Please write in your answer.)

   ☐☐☐,☐☐☐ people

5. How many full-time equivalent outsourced employees, consultants, or contracted **people** are employed by this IS organization? (Please write in your answer.)

   ☐☐☐,☐☐☐ people

6. How many **levels** below the highest manager/executive in your organization does the top information systems manager/executive (CIO) report? (Please mark just one.)

   ☐ (A)   CIO is highest manager/executive (0 levels)
   ☐ (B)   CIO reports directly to the highest manager/executive (1 level)
   ☐ (C)   CIO reports to someone who reports directly to the highest manager/executive (2 levels)
   ☐ (D)   3 levels
   ☐ (E)   4 levels
   ☐ (F)   5 or more levels

7

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Instructions: Please mark the ONE answer that best describes your response to each of the following statements. Mark 0 if the question is not applicable (NA) or you don't know the answer. Think of the scale from 1 to 9 as a continuum from total disagreement (TD) to total agreement (TA) with the statement provided. For a neutral (N) response, mark 5. Refer to page 1 (item 5) for a complete description of the scale.

NA	=	0	=	This question is <u>not applicable</u> or I <u>don't know</u> the answer
TD	=	1	=	<u>totally disagree</u>
N	=	5	=	<u>neutral</u> (neither agree nor disagree)
TA	=	9	=	<u>totally agree</u>

7. This IS organization: NA TD   N   TA
   7a. utilizes a comprehensive IS assessment system.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
   7b. does extensive benchmarking to other IS organizations.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
   7c. makes extensive use of the following methods to estimate the cost of IS development, maintenance, and conversion projects.
       (1) number of lines of code   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
       (2) function points   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
       (3) other _____   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

8. This IS organization evaluates its performance using the software development practices of the Software Engineering Institute's (SEI's) Capability Maturity Model (CMM).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

   8a. If your IS organization does evaluates its performance using SEI CMM practices, at what **level** would your IS organization be assessed? (Mark one)

   ☐ (1) Initial (level 1)
   ☐ (2) Repeatable (level 2)
   ☐ (3) Defined (level 3)
   ☐ (4) Managed (level 4)
   ☐ (5) Optimizing (level 5)

9. This IS organization measures the quality of the service it   NA TD   N   TA
   provides (**service quality**).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

   9a. To assess our **service quality**, we measure our customers perceptions of our:

      9a1. Tangibles: Physical facilities, equipment, and appearance of person-   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
      nel.

      9a2. Reliability: Ability to perform the promised service dependably and   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
      accurately.

      9a3. Responsiveness: Willingness to help customers and provide   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
      prompt service.

      9a4. Assurance: Knowledge and courtesy of employees and their ability to   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)
      inspire trust and confidence.

      9a5. Empathy: Caring, individualized attention we provide our customers.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

      9b1. Other **service quality** factors (please describe).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

      _____
      _____
      _____
      _____

8

10. This IS organization measures the quality of the information processing system(s) it provides (**system quality**).

NA TD   N   TA

(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a. To assess our **system quality**, we measure:

10a1. System reliability.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a2. Response time.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a3. Ease of use.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a4. Ease of learning.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a5. Convenience of access.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a6. Flexibility of system.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a7. Integration of systems.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a8. Perceived usefulness.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10a9. Usefulness of specific functions.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

10b. Other **system quality** factors (please describe)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

_____

_____

_____

_____

11. This IS organization measures the quality of the information system(s) output (**information quality**).

NA TD   N   TA

(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a. To assess our **information quality**, we measure:

11a1. Accuracy.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a2. Currency.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a3. Timeliness.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a4. Reliability.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a5. Understandability.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a6. Relevance to decisions.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a7. Completeness.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a8. Perceived usefulness.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11a9. Comparability.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

11b. Other **information quality** factors (please describe)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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12. This IS organization measures the extent of use (or user consumption of the output) of the information system(s) it provides (**information use**).

NA TD   N   TA

(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12a. To assess **information use**, we measure:

12a1. Frequency of use.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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12a2. Percentage of time used.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12a3. Use versus nonuse.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12a4. Number of features used.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12a5. Extent of use.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12a6. Regularity of use.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12a7. Voluntariness of use.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12a8. Use at anticipated level.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12a9. Motivation to use.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

12b. Other **information use** factors (please describe)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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13. This IS organization measures the user response to the use of the output of an information system (**user satisfaction**).

     NA TD   N   TA

     (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a. To assess our **user satisfaction**, we measure:

13a1. User satisfaction (39 items, (Bailey & Pearson, 1983)).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a2. User information satisfaction (UIS, 13 items)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a3. User satisfaction (other).   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a4. User enjoyment.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a5. User delight.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a6. Overall satisfaction.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a7. User dissatisfaction.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a8. User complaints.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a9. Decision-making satisfaction.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13a10. System specific satisfaction   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

13b. Other **user satisfaction** factors (please describe)   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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14. This IS organization measures the effect of the output of an information system on the behavior of the user (**individual impact**).

     NA TD   N   TA

     (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a. To assess the **individual impact**, we measure:

14a1. Quality of decisions.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a2. Time to make a decision.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a3. Time to complete a task.   /   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a4. Decision confidence.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a5. Number of (decision-making) alternatives considered.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a6. Amount of (decision-making) data considered.   (0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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14a7. Overall benefit/worth to the user.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a8. User productivity improvement.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14a9. User communication improvement　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

14b. Other **individual impact** factors (please describe)　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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15. This IS organization measures the effect of the output of an
information system on the behavior of the team or workgroup
(**workgroup impact**).

NA TD　　　N　　　TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a. To assess the workgroup impact, we measure

15a1. Participation level.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a2. Meeting frequency.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a3. Meeting quality.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a4. Communication quality.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a5. Problem solution quality.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a6. Team productivity.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a7. Meeting equity.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a8. Decision quality.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15a9. Decision efficiency.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

15b. Other **workgroup impact** factors (please describe)　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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16. This IS organization measures the effect of the output of an
information system on organizational performance (**organizational
impact**).

NA TD　　　N　　　TA
(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a. To assess our organizational impact, we measure:

16a1. Return on assets (ROA).　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a2. Return on investment (ROI).　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a3. Marketing achievements.　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a4. Innovations.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a5. Market share.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a6. Stock price.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a7. Cost-benefit ratio.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a8. Cost reductions.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a9. Productivity.　　　　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

16a10. Economic value-added (EVA).　　(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)

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	NA TD	N	TA
16a11. Net present value (NPV).	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)	
16a12. Internal rate of return (IRR).	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)	
16a13. Payback period.	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)	
16b. Other **organizational impact** factors (please describe)	(0)	(1) (2) (3) (4) (5) (6) (7) (8) (9)	

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Thank you for your time. Please return this completed form immediately using the prepaid business reply envelope.

HELP WANTED: In the interests of helping all IS Managers succeed, if you have an assessment technique, tool, or other materials and are willing and able to share these with other IS Managers, please do so. We can and will facilitate such sharing, so if you would like to include something in the return envelope with this questionnaire or jot something down in the small space below, please do so now. Issues of particular interest are: (1) how to store, organize, manage, and use IS assessment data; (2) the decision rules you use to select IS dimensions for assessment, specific measures to use, and frequency of assessment; (3) tips and success stories for raising awareness and convincing management and users that IS assessment is important; and (4) standards you have established for IS performance.

If you are including materials in the return envelope or writing comments below, please indicate here.

☐ Yes, I'm including materials or comments

If you prefer, you may email materials or information to **blmyers@nnu.edu** or mail them under separate cover to Barry Myers, Math/CS Dept., Northwest Nazarene University, 623 Holly ST, Nampa, ID 83686.

If you would like to be credited by name or organization, please include that information below or on the documents you enclose. If you prefer anonymity, just mark out all identifying information on your documents. THANK YOU FOR YOUR COOPERATION -- WE'RE IN THIS TOGETHER.

12

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