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An Analysis of Information Technology Investment Justification for Minnesota State Government

by

Nancy Jo Johnson

M.B.A., University of Minnesota, 1990
B.S., University of Minnesota, 1975

Dissertation Submitted in Partial Fulfillment
of the Requirement for the Degree of
Doctor of Philosophy
Applied Management and Decision Sciences

Walden University
August 2001

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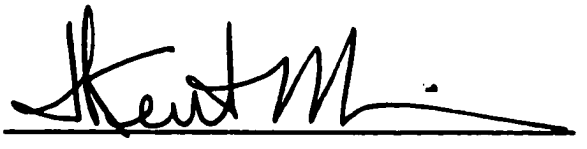

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ABSTRACT

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ABSTRACT

This research examined the results of the process by which Minnesota state government evaluated and funded agency proposals for major information systems projects and the opinions of the key participants. Knowing what to include or not in information technology proposals has been a conundrum since computer-based information systems became available to nonscientific organizations. Analyses of the contents and presentation quality of 51 proposals from two legislative biennia (1994-1995 and 1996-1997) were compared to the funding level recommended and received. Interviews with 25 key proposal preparers, reviewers, and funders were conducted to determine their opinions. The extremely well-prepared proposals were much more likely to receive full funding from the format. The more technically knowledgeable reviewers were less influenced by the appearance of the proposals than were the legislators. Not citing risks of success for projects in the proposals resulted in a significantly lower likelihood of receiving full funding. Some less well-prepared proposals received funding, demonstrating the influence of factors other than appearance. The interviewees rated inclusion of executive leadership, the value of the reputation of agency/staff, and accurate estimates as the most important factors in the proposal documents, which are all perceptual. Presenting a carefully edited, well-researched proposal resulted in a greater likelihood of receiving funding.

ACKNOWLEDGMENTS

The researcher wishes to acknowledge her gratitude for the continuing support and encouragement of her husband, Michael R. Addy, and his parents, Dr. Richard and Mildred Addy. The content and process guidance from her Walden advisor, Dr. Reza Hamzaee, and dissertation committee of Dr. Lilburn Hoehn and Dr. David Stein during her doctoral studies has been invaluable. The original idea for the dissertation research topic was suggested by Bernie Conlin, retired Assistant Commissioner of the Department of Administration of the State of Minnesota. The willingness of the Information Policy Office professionals to share their time, expertise, and archives with the researcher was above and beyond expectations and greatly appreciated.

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Chapter 1

Introduction to the Study

Introduction

Successful organizations of the 1990s and beyond have been those that understood the value of information as an asset in product value generation, similar to land, machinery, customers, and employees (Brynjolfsson, 1993; Callon, 1996; Kraemer & Dedrick, 1992). Recognition of the value of information, the value of systems that collect, transform, and deliver the information, and the prudent acquisition of the technology are critical responsibilities of management in any organization (Parker, 1995; Quinn, 1992). Spending on information technology continues to increase exponentially in all economic sectors. The federal government spent $150 billion on information technology in the 1980s (LaBonte, 1992), and in 1994 state and local governments spent over $30 billion on computers and communication systems (Richter, 1994).

To acquire the necessary information systems, managers must present convincing investment arguments supported by payback estimates. Effective proposals have been those that garnered full funding support. The understanding of effective investment reasoning models for information technology (IT) has been primarily generated from private sector experiences (Kraemer & Dedrick, 1997). The models have been based on experiential knowledge, recognition of failure factors in hindsight, correlation of IT investment to increased profitability, and the prevailing culture of the managerial team (Fitzgerald, 1998). In the private sector, the primary motivations are profits, improved competitiveness, and increased market share. In the public sector, the motivations are successful program delivery and the public good (Serafeimidas, 1996).

Public sector managers have had to adapt private sector models to their environment. Mansour and Watson (1980) concluded that government organizations operate in an environment that is substantially different from the private sector. Adapting parts of private sector justification models to meet the prime motivators of the public sector managers has been challenging, as the environments have different reward structures. Public sector investment models are not well-understood or investigated through academic research (Rubin, 1986; Tien & McClure, 1986).

Public sector agencies have created a variety of procedures and models for IT investment justification using parts of the private sector models and incorporating the governmental unit's goals. Private sector investment models do not always easily translate to the unique aspects of a governmental environment (e.g., nonprofit orientation, fear of failure risk, cumbersome procurement procedures, difficulty in quantification of results without the profit measures) (Rubin, 1986; Serafeimidas, 1996). Determining the efficacy of the public sector models based on past funding rates can provide guidance in identifying successful models. Assessing the interests and priorities of the governmental decision makers can provide additional information on perceptions of compelling information to use in the investment justification models (King & Kraemer, 1985).

Despite the challenges, the State of Minnesota has been aggressive in its use of information technology, and garnered national recognition for the results (Caudle, 1994; Towns, 1998). In the certainty of decreasing tax revenues and increasing expectations from citizens, the state is mandated to utilize IT as a lever to improve service delivery and contain operating costs. Individual state agencies, as well as multiagency projects, require funding to execute the major IT projects necessary to meet program goals.

Agency managers need guidance on creating effective investment proposals. In 1994, all 128 state agencies were asked to use a common proposal format of six major Information Resource Management (IRM) categories (State of Minnesota, Information Policy Office, 1994b). Each proposal needed to have the six IRM sections to be considered for funding. The state's investment proposal model has not been formally evaluated for its effectiveness in securing funding, and the state agencies need guidance on preparing the most convincing investment justifications in order to obtain the funding for the needed IT projects (B. Conlin, personal communication, July 16, 1996).

Determining the effectiveness of the State of Minnesota IT investment proposal documents in obtaining funding can benefit the state agencies in their quest to obtain the information systems necessary to carry out programs. Knowing which proposal components influenced the decision makers' responses can guide the construction of successful proposals. When agencies are able to obtain needed information systems to support program delivery, citizens benefit from the increased effectiveness of state government operations.

Statement of Problem

Government managers need IT resources to execute the programs of agencies, and the first step in obtaining IT resources is to secure funding (Center for Technology in Government, 1997). Many State of Minnesota IT projects are far larger than individual agency operating budgets can absorb, so special requests must be created by the agencies for the legislative funding bodies. Although a common proposal format is required, the problem for agency managers lies in understanding the effective components to convince the legislators of the worthiness of the proposal. The competition for the funds is pitched, and the legislative decision makers want assurances that the projects will be successful.

Through the determination of the characteristics of successfully funded IT proposals in the State of Minnesota government, as well as the preferences of the decision makers, concrete advice for constructing IT proposals can be derived. The agency managers make individual choices about the presentation quality of the proposal and the arguments to include in the proposals. Including arguments such as risks to the success of the project, quantified soft costs/benefits, and the project's fit with agency/state strategy are decisions of the proposal writers. The reputation of the agency, the legislative political agenda, and individual IT training/awareness are all factors that affect the legislators' decision making but may not be reflected in the proposal documents (Burgelman & Maidique, 1988; Parker, 1995).

The long-term success of any governmental entity depends on its ability to fulfill its mission to serve the citizens through controlled costs, more effective deployment of human resources, innovative delivery of services, and improved overall operating effectiveness (Kolodney, 1993). IT-based solutions can facilitate all of these efforts, as well as position the organization for continued adaptation to changing environmental circumstances. The State of Minnesota agency managers need to understand the components of a successful IT investment justification to earn the funding support of the legislators and governor to implement effective service delivery.

Background of Study

Both the public and private sectors must transform into effective producers and deliverers of tangible and intangible goods and services to remain viable and successful (Northrop, Kraemer, Dunkle, & King, 1990; Porter & Millar, 1985). In the private sector, the result of failure is going out of business. In the public sector, the result of failure is to have the function eliminated or outsourced to a private sector provider (Globerman &

Vining, 1996; *Making Smart IT Choices*, 1996). Drucker (1995) cited the improvement of government effectiveness, not just the cutting of costs, as the goal for re-invention through re-engineering.

Public sector managers must justify major IT projects with hard-to-measure outcomes. The task becomes even more difficult in the face of a lack of a specifically designed justification model for governments (Center for Technology in Government, 1997). When scarce tax revenues must be distributed across a spectrum of demands that include headline-worthy projects, the IT projects offering mainly operational benefits are hard pressed to compete against other government projects combating joblessness, hunger, ignorance, and deteriorating roadways. Two studies have shown that IT is ranked at the bottom of influence and power structures in all types of organizations, reducing the bargaining leverage for IT projects (Lucas, 1984; Saunders & Scamell, 1986).

Justifying investment in information technology has been challenging since computer-based information system resources became affordable to governments and businesses (Noble, 1989; Parker, 1995; Shangraw, 1986). The earliest computer systems provided leverage against human limitations (e.g., mathematical aptitude, ability to cope with large amounts of data, repetitive task endurance) and focused on increasing the efficiency levels. In the initial stages of IT adoption, displacement of human computational efforts (primarily clerical) was the easiest device to establish the costs and benefits relationship to calculate return on investment (ROI) or costs and benefits analysis (CBA). The clerical workforce also had the least power to resist the imposition of computer processing (Northrop, Kraemer, Dunkle, & King, 1990; Parker, 1995).

Pollalis and Frieze (1993) stated that traditional critical success factors (CSF) for investment justification were obsolete and did not reflect changes in technology capabilities, competitive advantage pressures, and organizational structure. The shift from systems-oriented measures of input and output to intraorganizational and extraorganizational measures forced a redefinition of the CSFs used. The IT commitment of the key decision makers and the organization's IT usage evolutionary stage determined the most appropriate CSFs to use in investment models (King & Kraemer, 1986).

Investment arguments contain hard and soft subjective measures. The estimates of payback rates, transaction volumes, maintenance requirements, operating costs, and systems life span are deemed objective (although they may be based on prejudiced estimates and intuition). They are rarely tracked for accuracy except in the case of failure (Lederer & Prasad, 1992). The accounting methods used to evaluate the objective measures infrequently require a justification of the accuracy of the collection methods. In a survey of managers, Holmes (1988) found that risk and ROI were the most important factors in computer systems proposals. The managers wanted some reassurance that the risks would be contained and that there would be a tangible payback. Northrop, Kraemer, Dunkle, and King (1990) and Bozeman and Bretschneider (1986) all recommended measuring a decrease in citizens' frustration with government data and services as a result of IT usage as a measure for public sector proposals. These findings present a challenge to public sector managers to justify their outcomes with soft benefits while incurring hard costs.

While the IT professionals have been accused of over-selling their proposed solutions, the decision makers are equally as often accused of having unrealistic

expectations and ignoring the limitations of the original proposal (Lucas, 1984). To increase the likelihood of IT proposals being sufficiently multidimensional, many organizations have adopted a multitiered review process. Proposal factor dimensions include (a) breadth of scope of problem solving, (b) detailed depth of investigation of costs/benefits, (c) congruent strategic directions and efforts, (d) honest assessments of human resources, and (e) degree of process innovation (Parker, 1995, pp. 332-351). Review bodies include advisory groups for technical feasibility and multidisciplinary groups (often called steering committees) for strategic fit with unit and organization goals, as well as the likelihood of success. The different review groups are intended to provide a balanced evaluation of each proposal aspect (Newcomer & Caudle, 1991).

The goal of a rigorous proposal review is to ensure that a multiplicity of viewpoints and experiences are represented, as well as a healthy skepticism to mitigate the optimistic projections of paybacks. This tiered review process is also intended to improve the likelihood of eventual success of the project through more realistic planning efforts and to disseminate a commonly agreed upon perception of the goals of the proposal. The reality is that even multitiered review processes do not always set equal expectations or guarantee that the original estimates are accurate (Edstrom, 1977). Benjamin and Levinson (1993) argued that IT-enabled change benefits are not always fully realized because the change management aspects of the project (on the culture and organizational structure) were not managed well.

Past State of Minnesota IT proposals have not been formally analyzed to ascertain the success of the format, nor have the specific interests of the individuals involved in approving the proposals been formally assessed. The current format has not been

significantly altered since its inception and needs revision to reflect changes in IT practices and state decision makers' preferences. Although the Information Policy Office (IPO) staff and functions were absorbed into the newly created Office of Technology (OT) in 1997, the proposal review process continued (Jossi, 1998). The OT continued its support of improving the proposal format (Implementation Plan for Shared Information Resources, 1997).

The research objective was to develop a better understanding of the components of a successful IT investment argument for the State of Minnesota agencies, to assist them in garnering support for critical IT projects to support agency programs. Using content analysis methods, the researcher evaluated the relationship of proposal components in relation to the funding recommended and allocated and the results of the interviews with key state IT proposal process individuals. With this information, the researcher created recommendations for modifications to the existing proposal components and process.

Scope and Limitations

The scope of the research was twofold. First, the researcher evaluated and coded the content and presentation quality of the 51 proposals (averaging 30 pages each) for IT investment and respective funding allocations in the State of Minnesota government in two biennia (1994-95 and 1996-97). The written documents that addressed the justification for the project investment are called Advanced Planning Documents (APD). These documents are in the public domain. Second, the researcher conducted interviews with a convenience sample of the key individuals involved in the state's proposal writing, review, and funding process. A limit of the research design was the relatively small number (less than 50) of individuals in the State of Minnesota who were associated with the preparation and review of the IT funding proposals. Not all agreed to be interviewed;

however, 25 did. Structured, in-depth interviews with them provided insights about their perceptions of the limitations and strengths of the standardized proposal format.

The proposal data were limited to two legislative biennia of the government of the State of Minnesota, utilizing a consistent APD format. The proposal documents were archived by the IPO, but the verbal discourse was not documented or public. The scope of the research did not include the intangible influences of prejudice, political agenda, competition with other proposals for funds, verbal lobbying, or other forms of influence related to the funding of IT project proposals.

The value of the results of this investigation are limited in that they can only be directly applied to the State of Minnesota. Another limit is that there has been, and will be, turnover in key positions in the legislature, IPO, OT, and governor's office. New individuals will bring new expectations and preferences. The specific recommendations may not be directly compatible for adoption by other state governments because of approval processes, budgeting methods, funding sources, and individual agency IT expertise levels. However, the general results may be helpful for other public sector and government organizations in improving their own IT project funding processes.

The proposal format used reflected the priorities of the State of Minnesota and the prevailing body of theory about IT usage at the time it was created. The researcher assumed that each agency had received the same instructions about preparing the proposals from the IPO and had equal opportunity to ask clarifying questions. State and agency priorities, as well as IT knowledge and practices, have shifted over time but are not necessarily reflected in the proposal format. Individual IT acumen was not objectively measured, nor was the extent of individual political power.

The researcher acknowledges that a well-prepared proposal did not guarantee a successful project implementation, but it represented the professionalism of the agency. As General Sun Tzu stated over 2,000 years ago in his work, *The Art of War*, planning is necessary for success, but cannot guarantee it (Tzu, translated by Cleary, 100 B.C.E/1991). The study design did not assess the ultimate success of the projects in meeting projected costs and benefits after implementation. The proposals were created with the information available at the time they were written (which could have been more than 2 years prior to the actual inception of the project). The detailed investigation and planning that commenced after a project was funded often revealed more complexity in the requirements than originally anticipated (Bajjaly, 1993; Caudle, 1994; Holmes & Poulymenkous, 1995; Mahmood, Gemoets, & Jacquez, 1996).

Research Questions

The research questions focused on the proposal content and quality, and the experience and opinions of the individuals involved in the preparation, review, and funding of the APDs.

1. What are the differences between the funding amount requested by the agency and the percentage of funding recommended and granted to each proposal? What differences exist in the level of funding recommended by the IPO and the legislators for poorly versus well-prepared proposals? Parker (1995) concluded that poorly presented written presentations are less effective in successfully obtaining approval. Well-prepared, complete proposals should be funded at a higher percentage of request than proposals that are not complete or well-prepared. The proposal document may be perceived as a demonstration of the agency's ability to successfully implement the IT solution, but it

cannot reflect the intangible factors such as the reputation of the agency or the promotion efforts of the IT champion.

2. Were the proposals with soft costs and benefits cited more likely to receive a higher percentage of requested funding from the format? Hard costs/benefits are expected in all proposals, but inclusion of soft costs/benefits is not consistent and is a decision of the preparer. Newcomer and Caudle (1991, p. 377) and Chung-Yuang (1989) cited the importance of providing holistic proposal evidence balanced between quantified (hard) and qualitative (soft) data sets. Perry and Wise (1990) cited the primary motivations of the public servant to be serving the public interest and less dependent on utilitarian incentives, supporting the expectation that soft benefits could be more important than the hard financial analysis in decision making. The researcher expected that soft costs and benefits are cited in the proposals to provide a full set of evidence for evaluation.

3. What differences exist in the percentage of requested funding received between the projects that were positioned either as part of a strategic effort or mandated by external authorities, compared to those not positioned for those reasons? The Office of Technology in Minnesota has been committed to effective and efficient government and supporting the investments that lead to that goal (Jossi, 1998), implying that project positioning to support strategic objectives is important. The nature of organization-wide strategic planning to improve communications and operations dictates the establishment of building blocks of strategic IT systems (Benjamin & Levinson, 1993; DeLisi, 1990; Overman & Simanton, 1986). Strategic needs and external mandates for new programs often pushed the IT investment argument to a higher level than did simplistic financial measures.

4. Were there higher percentages of requested funding levels for project proposals citing risk assessments, compared to proposals without risk? While the strategy in proposal writing may be to present a positive view without raising negative possibilities, funders ask hard questions frequently about risk mitigation plans to ensure successful implementation. Bacon (1992), Classe (1997), and Fitzgerald (1998) all theorized that the inclusion of different types of risks in proposals was critical for funding support. Bozeman and Bretschneider (1986) ranked avoidance of risk as one of the highest concerns for public servants, implying that risk should be addressed explicitly to reassure the decision makers that the project has been well-thought out and plans have been made to contain the manageable risk. The researcher expected to find risk identified in the proposals.

The second set of research questions concerned the individuals involved with generation, review, and funding of proposals. The opinions of the individuals are as important as the written document, based on the preliminary interviews and the literature. The interview questions addressed individuals' training and experiential background and their opinions on the APD format, funding process, and perceptions of reward.

5. What were the educational and experiential differences between the groups of respondents (preparers, evaluators, and legislators)? Both Kiel (1986) and Walsh (1991) stated that there were significant perceptual and information management knowledge differences between IT professionals and end users, based on training and priorities. The differences influenced perceptions of the relative importance of proposal factors. Lambert and Peppard (1993) cited the need to integrate the multiplicity of viewpoints from end users, senior management, and the IT professionals in evaluating any proposal. The

researcher expected to find differences between the groups of process participants in education and experience with IT issues.

6. How much similarity was there in the respondents' ranking of the most and least important factors in the proposals? Creating effective proposal formats depends on understanding the perceptions of the key stakeholders, who may value proposal components differently due to training and experience. Identifying stakeholder preferences and biases is part of providing guidance to proposal preparers. Pollasis and Frieze (1993) stated that traditional CSFs are obsolete, and Holmes (1988) stated that ROI and risk were the two most important measures in IT investment justifications. Bariff and Lusk (1977) cited cognitive styles and implementation apprehension as two major factors in differentiating user perceptions. Bacon (1992) found that the support of explicit business objectives and response to competitive pressures were the most important factors in selecting IT investments. Symons (1996) recommended demonstrated linkages between content, context, and process in the proposal evaluation process. The breadth of theories about effective proposal aspects supported the researcher's expectation of differences in factor importance ranking between the state's process participants.

7. How is the importance of the written proposal ranked in comparison to the CIO's reputation and persuasion? The pretest results indicated that the lobbying by the IT champion has the most influence on the eventual funding decision, but the written proposal has influence in the process too. Based on her research and that of others, Beath (1991) cited the importance of the IT champion in promoting and obtaining the support for a project. Earl and Feeny (1994) theorized that the CIO was the most critical factor in

determining whether the rest of the organization perceives IT as an asset or a liability. The CIO reputation for the agency may be a stronger influence on funding than the written proposals.

8. How are the proposed costs and benefits verified after the project is implemented? Although systematic post-implementation evaluation is highly recommended by MIS theorists, the researcher does not expect to find evidence of it. The traditional systems development life cycle theory dictates the evaluation of a project after implementation, to create a body of generative learning for the organization. Fitzgerald (1998, pp. 16-19) stated that follow-up on promised results is rarely conducted because IT performance is so dependent on perception instead of easy-to-quantify measures. The State of Minnesota legislative auditor's report on the Statewide Systems Project (1997) also recommended that postimplementation audits should be done in a formal manner on all projects, although they have only been conducted on projects perceived to be failures.

9. What is the incentive for the preparers of the proposals to produce an excellent APD? Bozeman and Bretschneider (1986, pp. 478-481) concluded that the public sector does not provide tangible outcome/performance rewards, due to lack of fiscal connection between agency revenues and volumes/customer satisfaction levels. Instead, the public sector compensation model utilizes a fixed salary, with intrinsic rewards as motivators. The state's rewards for proposal preparers are expected to be nonmonetary and based on intrinsic motivators.

The variables in the research design for the APDs included (a) the percentage of funding levels requested by the agency, recommended by the IPO, and the actual legislative funding granted to each project, (b) the quality of the overall APD and each

section, (c) citation of specific constructs related to positioning, risk, and hard/soft benefits. The variables related to the individuals interviewed included (a) education, (b) experience, and (c) opinions about the state's process.

Significance of Study

The significance of the study lies in determining the most effective parts of IT proposals for the State of Minnesota, so that agencies can be advised on the best strategies to obtain funding to execute critical government programs. The relationship of past proposal facets and known funding results, combined with the opinions of stakeholders, resulted in specific recommendations for improvement of the document format and process. All types of governmental entities have faced public demands for more effective improved services in the face of diminishing tax bases and revenues (Drucker, 1995; Osborne & Gaebler, 1993). Needed governmental IT solutions are large and expensive, mandating investment arguments that win funding based on observable returns. Pressures on the private sector in the 1980s (e.g., global competition, deregulation, increased customer demand for improved service levels, 24x7 information access, reduced production cycle times, reduced overhead costs, improved effectiveness) have reached the public sector. Taxpayers expect delivery of governmental services at a time and in a mode that is convenient to them (Caudle, 1994; Center for Technology in Government, 1997; General Accounting Office, 1997).

New hardware, telecommunications, and software alternatives present tremendous opportunities for government organizations, but the level of investment required to deal with outmoded legacy information systems is daunting. The *New York Times* (Sept. 8, 1998, p. 20) reported an estimate for the federal government to fix the Year 2000 problems of at least $5.4 billion. For managers trying to effect substantial process

reengineering, legacy systems present formidable sunk cost barriers. The magnitude of the effort required to change established technological, human, and transactional processes can be a strong deterrent to undertaking the transformation process.

Another aspect of significance of the research is the government managers' need to construct successful IT proposals based on demonstrated linkages of specific components to funding success. Without effective investment arguments, the managers cannot obtain the information systems needed. Enabling governments to be more effective in the utilization of scarce tax revenues through the information systems lever can have a positive long-term impact on society. Population demographics are clear in their prediction of governments having to provide services at a higher level with greater utility in the face of eroding tax revenues. The baby boom generation will start retiring by 2010. They will take more money out of the government systems than can be replaced by the number of new workers entering the workforce. In 1993, six taxpayers supported every five benefit receivers; however, in 2000 there was expected to be only four taxpayers supporting every five tax receivers (Kolodney, 1993, p. 8).

Governments have faced so many challenges in obtaining and using IT that they are estimated to be 10 to 20 years behind the private sector (General Services Administration, Performance Based Management, 1996; Osborne & Gaebler, 1993; Wilson, 1989). Total government expenditures as percentage of gross domestic product have steadily decreased from a high reached in 1991; however federal outlays increased by 11% in real terms from 1988-92 and only 5% from 1993-97. Expenditures were expected to increase less than 1% by 2002, which is a clear indicator of the scarcity of the funds available for investment (Mechling & Sweeney, 1997, p. 32). Providing more guidance on the

effective components of IT proposals will aid other public sector managers in obtaining much needed information resources.

Assumptions

In determining the need for and form of a research project about IT proposals, the researcher made the following assumptions. The researcher assumed that the State of Minnesota would continue to keep IT a high priority for improving the delivery of services to citizens and businesses of the state, and that agencies would continue to need guidance on securing funding for proposals. Guidance for preparation of effective IT proposals can have long-term benefits when the agencies are able to obtain funding. The past written proposals provided the only documented evidence of the efforts expended by the agencies in seeking funding, with the results reflected in the actual funding received.

The researcher assumed that the evaluators and funders of the IT proposals evaluated the proposals rationally, but were subject to the influences of the political climate and individual perceptions of the agencies' abilities. The researcher also assumed that the verbal lobbying was not documented, nor were the political agenda of the decision makers. The researcher assumed that the individuals involved with proposals had skills comparable to those of private sector practitioners.

Definitions of Terms

Advance Planning Document (APD): The term used within the State of Minnesota for the proposal documents for major information technology project funding, submitted to the legislature for review and funding recommendation. The proposals follow a six-section format based on the principles of information resource management, as laid out by the Information Policy Office.

Enterprise Resource Planning (ERP): Strategic planning for the management and administration of information across the entire organization, with emphasis on data integrity, data standards for interchangeability, seamless integration across systems and platforms, and strategic value gleaned from using the information to support decision making (Strassmann, 1997a)

Information Policy Office (IPO): The department created by the Minnesota state legislature to provide oversight and initial evaluations of all information systems proposals from any of the 128 state agencies.

Information Resource Management: A holistic management perspective of managing the information systems and their usage by an organization.

Informating: A term coined by Zuboff (1988) to describe the transformation of processes and products through the application of information technology. It refers to the incremental improvements that add value beyond the simple automating of a process.

Malversation: A term describing the results of abuse of public office by incumbents, resulting in loss of citizens' trust and political rights (Willcocks, 1994).

Office of Technology (OT): Created by governor Jesse Ventura to consolidate all computer technology functions within the Minnesota State government, as well as in all public venues within the state. Originally an independent department, the OT was later subsumed into the Department of Administration.

Poorly prepared proposals: APDs that are poorly written, not proofread or spell checked, inconsistent with the IRM outline, missing rationales, lacking supporting evidence, or poorly organized.

Well-prepared proposals: APDs that are written to provide a complete, coherent, logically organized, proofread, and fully supported argument for investment.

Summary

Wise investments in IT are necessary for governments to respond to public pressures for improved effectiveness, and public sector managers need to be able to construct effective investment arguments to secure full funding for IT projects. The challenge of constructing effective arguments lies in understanding the factors that influence funders' positive perceptions of the proposals. Analysis of the past proposals (with known funding results) and the opinions of the key players in the funding process can provide insights into future construction of successfully funded proposals for the State of Minnesota.

Chapter 2

A Review of the Literature

Introduction

To understand the theory and issues surrounding the justification of IT investment in the public sector, the researcher reviewed two major groups of literature. The first group of literature addresses the value of IT to organizations, investment rationalization models, and trends in evaluating IT investments. MIS literature has rarely focused on public sector applications (Rocheleau, 1992; White, Adams, & Forrester, 1996; Willcocks, 1994), and the public administration literature has rarely addressed MIS utilization (Kraemer & Dedrick, 1997). While many managerial and operational issues cross all sectors, the public sector does have unique characteristics compared to the private sector. The public administration literature provided a basis for the examination of the State of Minnesota funding processes, people, and proposals.

Information is a critical component of an organization's ability to transform itself and effectively operate (Burgelman & Madique, 1988; Davenport, 1997). Organizational forms and products shift in reaction to the external influences, mitigated by existing power hierarchies and physical constraints (Senge, 1990). Transforming from industrial era producers of goods into information age service producers was deemed *creative destruction* by Nolan and Croson (1995). Moving through the early stages of using IT in organizations (for automation and information) culminated in transformation of the management and organizational styles employed to new levels of effectiveness (Serafeimidis, 1996, pp. 184-188).

Public sector organization managers face pressures from citizens' expectations for improved service and decreasing tax revenues. Managers have found greater difficulties

in justifying massive re-engineering projects, new product/service delivery systems, and information systems with soft benefit paybacks (Kolodney, 1993). Lacking the bottom line profit measures, shareholder value, and cost accounting systems of the private sector, the public sector managers have used different techniques to demonstrate effectiveness and return on investment (Kendrall, 1993).

Selling the IT investment to decision makers is a crucial first step in the process. Governmental decision makers are perceived as concerned about limiting public exposure, reducing costs, and possessing limited awareness of sophisticated justification arguments. They are also thought to be unlikely to accept arguments focusing on intangible paybacks such as improved work atmosphere, customer service, policy formulation, and informed managerial decisions (Bozeman & Bretschneider, 1986, pp. 475-482). Political incentives for government workers are classified as low power incentives because the approval of the voters only ensures a future re-election, not an immediate pay raise or bonus. Proposal writers find it difficult to measure efficiency improvements because of lack of cost accounting systems and readily available means to measure process cycle costs (Frant, 1996, pp. 366-369). On the positive side, using simulations forces decision makers to articulate their assumptions, but the process of soliciting their opinions must be done overtly (Kraemer & Dedrick, 1997, pp. 91-93).

Government decision makers are not all trained in the theories and practices of current IT investment models. They often only see clerical labor displacement potential (Rubin, 1986). Moving IT benefit arguments from labor savings to value-added knowledge benefits requires an institutional attitude change (Tien & McClure, 1986). IT enabled changes must be radical and transformative to produce significant returns on

investment (Osborne & Gaebler, 1993). Providing governmental managers with effective investment models is key to obtaining the needed information technology levers.

The unique dimensions of a public sector government environment are multifold. The dimensions include (a) lower tolerance for risk of failure in the public sector, (b) lack of cost accounting systems, (c) short-term (1 or 2 year) budgeting systems, (d) lack of competitive entities, (e) little threat of extinction, and (f) ill-defined or conflicting measures of success (Tien & McClure, 1986). Adaptation of private sector investment justification methods to the public sector has been fraught with translation errors because of the fundamentally different motivation and reward factors (Bozeman & Bretschneider, 1986).

Understanding of the wholeness of the continuing information systems investment challenge requires examinations of the literature about the perceived value of information systems, types of costs, justification models, organizational environment influences, and argument bases.

Value of Information Systems

The growing recognition of the role and value of information in transformative efforts is acknowledged by foresighted leaders (Davenport, 1993; Parker, 1995). Few organizations utilize the best practices in IT enabled change management, according to Markus and Benjamin because they still subscribe to the theory that information technology is the magic bullet that will fix all the ills. Instead, Markus and Benjamin (1997), proposed using one of three models. The Tool Builder approach uses IT to transform the organization, while the Facilitator model provides all the IT tools for change but depends on management to use them wisely. The Advocate model uses the

change advocate to truly change the attitudes of the organizational management. The management challenge lies in determining the most appropriate change model.

The promise of computer-based information systems for organizations has been overestimated, misunderstood, and under scrutiny since the first introduction of machinery for production (Strassmann, 1997b). As Serafeimidis (1996, p. 184) pointed out, industry awareness has advanced through the stages of automation to information, and culminating in transformation of organizations by using re-engineering of processes and strategic positioning. The information systems of an organization are a reflection of measures of accountability of the organization (Apostolopoulos, Pramataris, & Doukidis, 1997). Most organizations are saddled with tactically focused information systems that were developed much earlier and reflected the way the processes had been structured (often called *legacy* or *heritage* systems).

Kolodney (1993, p. 37) cited IT as the infrastructure around which programs are built in alignment with the organization's objectives. This distinction shifts managerial thinking about IT from extraneous to intrinsic to programs and needs to be reflected in the budgeting approach for IT. Kolodney also cited increased collaborative efforts for governments and private sector enterprise as strategies to cope with decreasing fiscal resources for public sector organizations. Private sector investments in new IT structures, process re-engineering, improved customer satisfaction, new delivery methods to existing and new markets, and retraining of workforces have been justified for survival. Tangible and intangible benefits have been used successfully in the IT justification arguments. New organizational reporting structures, geographical structural configurations, products, delivery approaches, strategic alliances, and markets have all been facilitated by the

development and use of information technology (Burgelman & Maidique, 1988; Parker, 1995).

Ballantine and Stray (1998, pp. 3-5) provided a conceptual taxonomy for the information systems appraisal objectives of (a) justifying investments, (b) ensuring that installed systems continue to perform well, (c) providing decision tools among competing projects when capital rationing is an issue, (d) controlling expenditures during IT project implementation, and (e) creating a base of knowledge to be applied to future projects. The objectives are analogous to the technology valuation managerial factor pyramid concept developed by Tipping, Zeffren, and Fusfeld (in Katz, 1997, pp. 80-93). At the lowest foundation level are the asset value of the technology itself and innovation support through research and development. At the next higher strategic level is the integration of IT with business and portfolio assessments. The top of the valuation pyramid is the value creation through the use of research and development for IT. Both models provide categorization for the multiple IT investment justification styles.

IT benefits are typically categorized as hard, quantifiable amounts and soft intangibles. Fitzgerald (1998) categorized benefits as (a) efficiency, (b) effectiveness, (c) contribution to business strategy, and (d) mandated projects. Value-add soft benefit dimensions include (a) increased absorptive capacity, (b) reduced processing cycle time, (c) expanded market access, (d) improved customer service, (e) extended mature product life cycles (by adding information components), (f) improved managerial decision making, and (g) positioning for future modifications. As Davenport posited, many people do not know what kind of information they need to achieve new goals and expectations (1997). Challenges to creating quantifiable estimates of the benefits are limited by the

accepted accounting practices and reward systems of the organization and the lack of a control situation (of not taking action) so that a comparison for the value of the change can be made.

Hierarchical organizational structures have been flattened over the past 20 years, forcing executives to develop skills in assimilating organization-wide data for decision making and new performance measures (Davenport, 1997). The competitive topology has changed irrevocably and successful managers must develop new strategies to adapt. Services can be delivered quickly to new consumer markets via kiosks, fax, telephone, the Internet, and interactive television (ITV). Strategic alliances allow a firm to leverage strengths of partner firms by outsourcing. New customers in global markets are now capable of learning about products via electronic delivery as new advertising venues create product awareness and demand (Callon, 1996; Nolan & Croson, 1995; Quinn, 1992; Stokes, 1991; Synnott, 1987).

The initial organizational structure for information systems departments was as a cost center with chargebacks to individual business units, implying that cost-effective performance of the machinery was the prime criterion. A more recent concept of investment center provides a more realistic construct, as information systems balances the added value of the systems against the costs of acquisition and maintenance. The term investment implies continuous maintenance to retain value (as opposed to viewing the initial investment as sunk cost), thus mandating a new perspective for management regarding the IT function (Cash, Eccles, Nohria, & Nolan, 1994). Strassmann contended that it is impossible to directly correlate the profitability of a firm with its investment in

IT, creating yet another conundrum for managers wondering how much or how little to spend on IT (Strassmann, 1997c).

Increased organizational awareness about the value of information systems in providing decision-making support has led to a new perception of information systems capabilities. The justification for hard dollar investment in transaction processing systems was based on clerical capacity, time, and salary return on investment. Justification has shifted to broad, intangibly based value assessments. Managerial time displacement, improved decision-making abilities, and increased spans of control have increased the value of human time and are soft benefits (Parker, 1995; Quinn, 1992). Another major benefit of investing in IT systems is cost avoidance or increased absorptive capacity (Bowen, 1986). Soft benefits make investment justification hard to construct, thus increasing the reluctance to use them in proposals.

The assumption that organizations would not change after computerization created an unrealistic managerial expectation for the software life span. The investment cost argument rarely included costs of hiring or training staff (The Soft Science of Buying IT, 1992). This legacy perception of using IT for only clerical efficiency persists today for many decision makers who have not been educated in the strategic developments in the role of information systems (Callon, 1996; Davenport, 1993; Parker, 1995; Strassmann, 1996).

Realizing the payoffs promised by new IT systems can take longer than expected or have reduced effects because of political and human resistance (Northrop, Kraemer, Dunkle, & King, 1990, p. 506). The payoffs for government investment will come from improved interaction with the public, cost avoidance, and the use of information in

nonfiscal management and planning (Northrop et al., p. 512). Porter and Millar (1985, pp. 154-157) wrote about the value of transformation via the use of IT in enabling new linkages and enhancing differentiation, and the message is still being learned. Organizations must expand the IT investment evaluation criteria boundaries beyond a one year budget-bound time frame and tie longer-term unit performance to overall organizational improvements.

Costs of Information Systems

The costs of using mainframe computers were couched in terms of the acquisition of the hardware and custom written software (Strassmann, 1997b). Benefits were expressed in terms of human work displaced, speed of production, and accuracy (Serafeimidis, 1996). Improved decision making and preventing opportunity-cost types of losses were rarely included (Framel, 1990: Schell, 1986). One-time acquisition costs were budgeted, but appropriate on going operational costs were rarely anticipated. Naive managers assumed that the software would always run as originally designed for static organizations. The reality was that the business constantly changed (Burgelman & Maidique, 1988). The managerial naiveté paradigm continues as they forget to budget for on-going upgrades, training, repairs, and replacements of personal computers.

As organizations developed more experience with using information systems, the reality of the developmental and maintenance costs became apparent. As more money was spent on systems, users were reluctant to replace obsolete software and hardware. Accounting systems in organizations were not designed to deal with fully developed information systems costs and benefits scenarios, since so many of the costs and benefits were "soft" and not recognized in the accounting records (Burgelman & Maidique, 1988: Callon, 1996; Parker, 1995).

Cost justification models for IT investments were based on eliminating staff, reducing errors, reducing required skills, or creating added absorptive capacity. The additional costs for programming, training, and maintenance were rarely factored into the decision (Callon, 1996; Parker, 1995). Costs have been ninefold or more over the lifetime of an information system (Yourdon, 1992). The inclusive cost of information systems acquisition and maintenance is termed Total Cost of Ownership (TCO). Controversy continues over the techniques used for accurately calculating TCO (Gibson, 1997). Strassmann (1997d) and Van Name and Catchings (1996) cited widely differing techniques, all perceptually influenced by each factor's relative weight. TCO factors included training, repairs, software upgrades, and productivity. The acceptability of any technique is dependent on having all the factors' weights fixed after negotiation, then documented for consistent application. TCO formulas may be different for each organization as a result of perceptions and biases.

Noble cited the two drawbacks of traditional cost justification techniques as (a) the monodimensionality of only using objective criteria (and ignoring subjective measures), and (b) not expanding the time boundary of the payback to a realistic period (up to 12 years). Intangibles such as customer satisfaction and reduced rework are difficult to quantify. The basic techniques of target payback periods, return on investment, and net present value all rely on quantification of estimates, yet require exacting manipulation of the estimates (Noble, 1989, pp. 44-47).

Moving organizations into the information age with business process re-engineering required new methodologies for recognizing value. The introduction of the value chain technique provided an effective technique to analyze processes and

identify opportunities to utilize IT, by reducing the number of steps and adding value to each step (Porter & Millar, 1985). The model forced an analysis of every stage in the transformation of raw material into the finished product, thus expanding the boundaries for identification of costs and benefits. The value of preventing problems at the start becomes apparent with the technique, as does the value of quality inspections at every hand-off step in the chain.

There was little accountability for the payback of early computer systems and they often became status symbols. Performance benchmarks were rarely established and few managers measured the real payback (including maintenance). The magic bullet idea of IT as the solution to every problem was rarely realized (Markus & Benjamin, 1997). Organizational resentment grew over the costs of maintaining the information systems (Davenport, 1993, pp. 15-27). The 1970s proliferation of system acquisitions (Nolan's contagion stage, as cited in Cash, Eccles, Nohria, & Nolan, 1994) increased the demand for computer programmers, similar to the Y2K repair situation. Despite the lack of understanding of costs, corporate spending on IT hardware, software, and personnel continued to escalate. IT spending in the UK was estimated to be $54 billion, with larger amounts spent in the United States (Ballantine & Stray, 1998). As new technologies emerged and as managers expanded acceptable influential arguments to include soft costs/benefits, the related cost accounting issues also evolved.

Investment Justification Models

Hawgood and Land (1988) cited IT project proposal evaluation reasons as (a) justification, (b) comparisons, and (c) project controls. Ballantine and Stray (1998, p. 3) added a fourth reason of proposals acting as a learning device to improve future project appraisals. Quinn and Bailey (1994) stated that many sophisticated managers

invested for intuitive reasons, unquantified factors, and reasons that have no single, satisfactory metric. Portions of private sector models can be directly applied to public sector cases, but the factors may be measures or motivations that do not exist in the public sector. Strassmann (1985, 1997b) asserted that there was no direct causal or correlational relationship between the investment in IT and profitability of organizations and noted Brynjolfsson's confirmation (1993). Yet few private sector organizations feel they are being effective if IT is not used. Strassmann questioned the measures of productivity that have been used and was adamant that computer usage only made management more effective by reinforcing rewards and performance measurement. Proudlock, Phelps, and Gamble (1998, p. 57) contrasted rational and opportunistic selection methods. Rational methods required awareness, interest, evaluation, trials, implementation, and diffusion of innovation. Opportunistic models bordered on anarchy, with lack of systemic planning or any of the characteristics of the rational method. Opportunistic models are rarely found in the public sector environment because of the checks and balances in the review process. Arguing against over-reliance on rational processes, O'Brien (1997, p. 71) cautioned against analysis paralysis in which nothing productive gets accomplished while there are futile attempts to measure efficiency and payback.

In defending why models are needed for investment justification, Zachmann stated, "A decision's factors are weighted in direct proportion to the ease of quantification" (1990, p. 94). He thought that successful decision-making models reduced the degree of uncertainty and intangibles by assigning values and weights to as many factors as possible. A corollary to Zachmann's Law is that more important decision factors are

harder to quantify, and less important factors are easy to count. The judgments involved in attempting to quantify these intangibles render them subjective. Serafeimidas (1996, p. 185) emphasized that the majority of evaluation techniques were based on rational and objective measures, and focused on the added value that the investment could bring. Each proposal evaluation technique has its own strengths and limitations, depending on the organization in which it is used. The growth phase of IT awareness of the organization is part of establishing the context (Cash, Eccles, Nohria, & Nolan, 1994).

The prescriptive IT investment proposal methodologies from the literature often are missing evaluations of their efficacy, creating the need for study and validation. Serafeimidas (1996, p. 189) recommended five essential parts to an investment conceptual model, based on an examination of the literature. The components include (a) objectives linked to those of the firm, (b) gap between the current state and the future requirements, (c) number of investment options, (d) continuous postimplementation evaluation, and (e) measurement of the actual benefits delivered by the system. The U.S. General Accounting Office (GAO, 1997) created a guide to assessing risks and returns based on reviews of private and public sector practices, but did not present a specific proposal format recommendation.

Setting priorities for the increased demand for information systems became more complicated as organizational managers realized the potential decision support improvements. Competing executives each thought they had compelling reasons for their project being first in the queue and pressured the CFO as squeaky wheels (Framel, 1990). It was impossible to expand the IT resources to fill the demands, so steering committees were formed to assign project priorities. Public sector entities already had multiple layers

of review and advocacy for allocation of public funds, thus replacing the need for entity-wide priority setting committees (Bretschneider, 1990). Users tend to present higher payback scenarios by ignoring maintenance costs in order to garner a higher priority in the request queue.

Many quantified factor models have been employed, but no single method has become universally accepted. Lacharite (1991) criticized traditional justification techniques for not adequately addressing intangible benefits and costs. He endorsed including an expanded set of factors in the argument. Organizations typically picked a hybrid model to allow comparisons across the pool of requests. Interpretation of the prescribed models varied by the proposer's skill level and intent. As Ballantine and Stray noted (1998, p. 4), the estimates could vary considerably, depending on whether the originator was IT or business user based. They also cited empirical studies that attempted to link the scheme with the culture and characteristics of the specific business, country, and size of organization.

Hard costs/benefits were easier to identify (e.g., hardware, programming, fines if regulatory changes were not implemented in a timely manner). The soft costs/benefits became matters of judgment (e.g., loss of productivity during learning curve, improved ability to make better decisions, improved customer service, reduced errors in data entry, reduced future maintenance time) without a solid estimation model (Schell, 1986). Metrics for IT effectiveness can be expressed in business terms of (a) reduced cycle times, (b) increased customer satisfaction, (c) future systems foundation building,

(d) increased synergy from related systems portfolio building, (e) reduced risk, (f) executive information systems (EIS), and (g) better anticipation of problems (Hawgood & Land, 1988; Holmes, 1988; Mansour & Watson, 1980).

Using meaningful business terms reflecting the culture of the organization in building cases can be more persuasive than using purely accounting terminology. System proposers are often technocrats who speak in obscure jargon, alienating the business users. IT professionals often have a different frame about the potential costs and benefits of the proposed system solution. Weldon (1995) and Ketler, Smith, and Weinroth (1992) cited significant differences in Myers-Briggs Type Indicator (MBTI) profiles of technical staff and the general population. The profile affects the ways in which individuals take in, process, and act on information. Computer professionals typically have MBTI profiles that include introversion, preference for concrete data, logical and methodical decision making, and a planned life. General managers have MBTI profiles that also appreciate planning, but are more likely to be in tune with feelings, extraversion, and intuitive knowledge. These fundamental differences increase the likelihood of miscommunication about perceived benefits and costs. Creating an atmosphere of agreed upon terms and concepts among the decision makers is imperative to understand intangibles.

The time frames of the IT proposals were usually based on the acquisition period and possibly a few years beyond, but rarely included costs over the system's entire lifetime. In reality, there were few reliable models to estimate the long-term costs of maintaining systems. Many decisions for cheaper short-term alternatives escalated in maintenance costs over the system's life, thus increasing the total cost of ownership. The inertia created by sunk costs deterred replacements, extending the system's life. Few

managers expected the systems created in the 1960s to still be in use in the 1990s, as evidenced by the Year 2000 crisis. Many decision makers have requested that IT proposals include estimated costs over time, but no reliable estimation techniques exist (Fitzgerald, 1998; Framel, 1990).

In summary, investment justification techniques vary widely in the hard and soft factors incorporated, the estimation techniques used, the time frames over which the estimates are estimates are projected, and the methods of evaluating the types of paybacks. Organizational decision makers are faced with the decision to evaluate the methods used in IT proposals and understand the variables that affect the consistency of the estimates presented to them. The accounting techniques used each have strengths and weaknesses.

Challenges of Investment Justification

The relative importance of information systems in organizations has increased, along with dependence. Yet as Fitzgerald (1998) pointed out, the MIS literature provides little data regarding IT performance measurement. IT investment models have run the gamut of detail and construction, depending on the organization and the managerial perogatives (Bretschneider, 1990; Caudle, 1990; Davies & Hale, 1986). The majority of the published research in the area of IT investment models has been from the private, for-profit sector. The absence of MIS research in public sector applications has not been readily explained, but some leading MIS researchers privately speculated that the reason was that there are more consulting dollars in the private sector (G. Davis, personal communication, June 13, 1996). Another reason may be the lack of easy-to-measure outcomes (e.g., profits, revenues, cycle times, product costs) in the public sector, making comparisons to hard dollar investment more difficult.

While private and public sector executives acknowledge the ability of IT to facilitate change in organizations, the investment argument is usually won by a combination of subjective measures. These factors include (a) managerial experience and training in strategic uses of IT, (b) trust in the individuals generating requests based on their reputation for delivering on promises, (c) confidence that sufficient resources are in place to ensure success of the project, (d) assurance that risk of failure is contained, and (e) perception of short and long-term paybacks (Bretschneider, 1990). The accuracy of subjective perceptions is difficult to measure (Hoffman, 1997). Fitzgerald (1998, pp. 16-19) reported that many researchers unsuccessfully attempted to find evidence of follow-up research on performance of IT systems against promises. Organizations rarely evaluated an IT system unless it was perceived to be a significant failure (Maglitta, 1996; Strassmann, 1996).

Convincing executives about the value of systems that supported long range, strategic type of decision making (e.g., executive information systems) was even harder because of the unstructured nature of executive work and analyses (Zachmann, 1990). EIS are usually created on the strength of executive mandate, not hard ROI measures (Belcher & Watson, 1993). Executives are looking for comprehensible investment cases that present believable and deliverable promises for change and improvement (Garrity & Saunders, 1998; Holmes, 1988). Northrop, Kraemer, Dunkle, and King (1990, p. 505) cited the power shifts in information systems that actually became a reinforcement of the existing power structures.

As with any organization, the decision-making protocol for a multitude of projects that demand more resources than are available is a critical process (Caudle, 1990). Public

sector program or service effectiveness has been measured on outcomes, and technology infrastructure often has received scrutiny in the scope of evaluation of success (Newcomer & Caudle, 1991, pp. 377-378). The evaluators focused on financial information systems (characteristically high volume tasks) and computer audit metrics (Lewis, 1990). Successful outcomes of government programs are often hampered by lack of sufficient information access. Information sharing between agencies and states is now feasible and often required for program success.

While many techniques for assigning priorities to multiple projects have been tried over the past 30 years, there is not a single, universally accepted model (Fitzgerald, 1998; Freund, 1990; Parker, 1995). Ideally, each organization developed a model for quantifying costs and benefits to create a compelling case for investment. The model was modified as managerial priorities changed and experiences dictated. A common proposal format was often required by steering/evaluation committees to facilitate comparison of projects (Horton & Marchand, 1982; Kaplan, 1994; Lewis, 1999).

In 1973, Nolan introduced the stages of computer growth in organizations model that described the four distinct phases of IT assimilation and spending as (a) initiation, (b) contagion, (c) control, and (d) integration. The formality of the acquisition process and controls over the use of IT became stronger as organizations progressed through the stages. Nolan's pattern has held consistent for organizations of any size and has proven true over time and across cultures (Cash, Eccles, Nohria, & Nolan, 1994).

The Software Engineering Institute's (SEI) Process Maturity Model provided another staged evolutionary model that moved from initial stages of anarchy to the mature, optimizing level that paralleled the growth in IT usage awareness of Nolan's

model (Yourdon, 1992, pp. 74-77). In contrast to Nolan's and SEI's views of computing adoption, another model of categorizing the evolution of information systems is automating, informating, embedding, and communicating (Cash, Eccles, Nohria, & Nolan, 1994, pp. 262-263). Zuboff (1988) created the term *informating* to describe the redefinition of job responsibilities through the addition of information.

Justifying the investment in information technology to nontechnical decision makers has been difficult. The easy-to-measure factors included (a) human processing time, (b) barriers to entry of competitors, (c) product life cycles, (d) reuse of information for new products/services, (e) profit margins, (f) error reduction, (g) cycle time, and (h) product attractiveness (Davenport, 1993; Keen, 1988, 1991; Porter, 1980). Intangible IT usage benefits such as (a) improved decision making quality, (b) increased opportunities for new product development, (c) increased flexibility in organizational structures, (d) improvement in employee quality of life, and (e) improved decision making outcomes have been used by project champions to convince decision makers of the value of the investment (Parker, 1995). Unique governmental needs such as federal mandates for program structure changes, devolution of authority, and the resulting voluntary compliance by local authorities are even harder to estimate, but critical for effective use of IT (Center for Technology in Government, 1997).

Disseminating the concepts and understanding of managing IT outside the doors of the IT department continues to be a challenge. Davenport (1993, pp. 112-114) identified true innovation of processes as stemming from an organizational impact statement that drives the development of both technological and social change. Education in MIS issues has only been a common part of business education in college curricula since the early

1980s, and not all organizational decision makers have business degrees (Davenport, 1993; Parker, 1995).

Executive awareness of methods for justifying IT investment continues to evolve. However, executives continue to rely heavily on financially based evaluation techniques as objective measures. Financial measures are understood, as opposed to the value of softer, strategic positioning. One of the challenges in constructing effective investment arguments is creating a lingua franca. As Hammer and Champy (1993) stated, managers are trained to think deductively (e.g., define the problem and a solution) instead of inductively thinking (e.g., recognizing a high potential solution or enabling technology and seek the problem to which it can be applied). This thinking bias adds another layer of resistance to softer arguments.

The estimation of the costs associated with systems development is limited by the time frame used. Private sector organizations often emphasize short-term payback expectations to maintain profits and keep stock prices high. This viewpoint makes long-term paybacks difficult to rationalize, unless the bonus and budgeting structure can reflect it (DeLisi, 1990). In the public sector, the time horizon for legislators is the next election, but it is longer for career civil servants (Caudle, 1994). The difference in the referential time frames make public sector investment cases even more difficult to construct.

The need for a viable federal public sector IT investment model has been the focus of a research program conducted by the Strategic Computing and Telecommunications in the Public Sector program at the John F. Kennedy School of Government at Harvard University (Mechling & Sweeney, 1997, 1998). Their reports included funding strategies,

private sector collaborations, project management, and staffing needs. Legislators are interested in proposals that provide them with the opportunity to say that they voted for projects that would streamline the operations of the government, reduce costs, improve service delivery, and better serve the taxpayers--by the next election. Explaining longer payback periods, or that savings come from eliminating state government jobs (possibly held by district constituents), decreases the attractiveness of supporting IT projects.

Resistance to IT-driven innovation comes from many parts of the organization. Executive stakes include preservation of organizational boundaries, power, and positions (Mumby, 1988, p. 63). If new IT systems change these, the executives will not support new projects. Employees and collective bargaining unit leaders within the government may also resent any changes in position requirements or skills (B. Conlin, personal communication, July 16, 1996). IT proposals that include realignment of organizational boundaries, creation of jobs requiring new skills, and elimination of management positions are not likely to be supported by officials because of the risk involved in changing the status quo (Bozeman & Bretschneider, 1986, pp. 480-481). King and Kraemer (1985, p. 492) cited three features of computing and power in governments: (a) the political significance of information, (b) the authority stemming from control over the computing resources, and (c) the affective power associated with managing a high visibility, sophisticated resource. Structuring a successful investment argument is challenging when the decision makers are reluctant to discuss covert power factors.

Another major barrier to understanding of major IT project proposals is the size, scope, and complexity of the project definition. Sweeping transformational and re-engineering efforts require organization-wide changes. The magnitude of the change

makes the comprehension and estimation of the project difficult and increases the fear of a failed project (Davenport, 1993). Breaking the effort into manageable pieces increases the likelihood of successful implementation. The Standish Group followed 23,000 IT projects since 1994 and found that the smaller the project, the more likely it was to succeed. Larger projects (over $750,000 and longer than 6 months) were less likely to succeed (Melymuka, 1998). When enormous projects are segmented, the challenge for managing the segment interfaces increases the coordination and communication tasks (and risk potential) for the project manager. There is always the additional possibility that all the pieces of a fragmented major effort would not be funded, thereby reducing the total effectiveness and transformative power of the overarching project.

Industry experience with information systems proposals that failed to satisfactorily anticipate costs and benefits, as well as the number of projects that never came to fruition, have created a warranted suspicion on the parts of the executive decision makers toward any IT proposal (Maglitta, 1996). The Gartner Group estimated 80% of projects did not meet their projected estimates or delivered promised functionality (State of Minnesota, Office of the legislative auditor, 1997). The Hackett Group (1998) reported that only 37% of large IT projects are done on time, and only 42% on budget. IT professionals have been accused of having solutions for which they are seeking problems, causing them to overpromise the results of the new systems.

The competitive changes of the 1980s forced organizations to a closer scrutiny of the value of their information systems. Many found they had inadvertently created islands of technology and data by designing information systems that emulated existing organizational structures. Instead of integrated functionally designed information systems

that met the service/product goals of the entire organization, organizations built information systems that served isolated departments (Davenport, 1997; Stokes, 1991). Even Senge (1990) failed to acknowledge the magnitude of the change required in information systems to transform an organization into a learning organization. As a result, the planning of information systems applications has been moved to the top organizational levels to create integrated enterprise requirements planning (ERP) systems, so that each project is evaluated in relation to the entire portfolio of IT applications and their ancillary effects (Benjamin & Levinson, 1993).

Selling an IT investment based on hard costs and soft benefits is far more challenging. Issues of service quality, future organization interoperability positioning, customer perceptions of service, cross-selling of products, and improved decision making can often sway a reluctant decision maker (Classe, 1997; Framel, 1990). Rockart and Hofman (1992) emphasized that leading edge managers must understand their current capabilities and envision their future needs to wisely invest in new technology. However, Rockart and Hofman neglected to address how public sector managers can envision much beyond the next major election. Authors of articles about IT benefits rarely cited public sector benefits, as Kendrall (1993) noted in his findings. Bretschneider (1990, p. 139) acknowledged that public sector researchers have been reaching into the business administration literature for inspiration, but not acknowledging superiority. Although the public and private sectors have shared the Weber bureaucratic organizational paradigm for many years, the research does not always note the commonality. IT investment arguments need organized hard benefits to be successful in funding.

Carlson and McNurlin (1992, p. 97) cited IT measures of value as (a) resources used, (b) IT efficiency, (c) business efficiency, (d) business effectiveness, and (e) business quality. But few cost accounting systems are structured to support these measures. The authors thought there was hope in activity based cost (ABC) management because it addressed delays and rework ignored by traditional methods. O'Brien cited the frequent corporate use of ABC to allocate IT costs to the business unit using the services (40% in a poll) (1997, p. 72). Research conducted by Henderson and Curley (as cited in Carlson & McNurlin, 1992, p. 97) categorized sources of IT value as stemming from changes in (a) economic performance, (b) key functions, and (c) organizational processes. Yet many of these positive aspects are hard to quantify because one can only speculate on the outcome of not using them. In the public sector, cost accounting is not widely used, nor are many of the critical measures tracked (Caudle, 1990; Reschenthaler & Thompson, 1996).

Financial constructs have been used in valuing investment decisions because of the ease of creating calculations as indicators of value, but mere numbers do not tell the entire story. To paraphrase Albert Einstein, not everything that can be counted counts, and not everything that counts can be counted. Yourdon (1992) deftly skewered the myths surrounding the consistency and veracity of software estimators for program development and testing, citing the differences of opinion on the use of function point analysis and metrics for programmer productivity (pp. 178-190). Relying on solely numerical indicators may appeal to linear thinking, quantification-oriented managers, but realistic investment cases must be constructed using many types of evidence. Managers

who demand IT investment cases couched solely in terms of numerical data will limit their understanding of the possibilities of the potential value of the investment.

There are many styles of IT investment justification methods that have been used and criticized for their gaps, and the evolution of the practice has expanded the boundaries of the initial impact of information systems (Parker, 1995). Keen (1991) cited the need to reduce organizational complexity in organizations by using IT to facilitate communication, thus improving the interpersonal and organizational relationships. DeLisi (1990) also endorsed the use of IT to influence organizational culture. Investment justification techniques now include (a) support of executive level objectives for creating strategic organizational positioning, (b) adding information components to extend the life cycle of mature products, (c) containing risk, (d) establishing enterprise-wide information resource management, (e) enabling process re-engineering to reduce cycle times and costs, (f) shifting organizational cultures, (g) building data warehouses, and (h) developing knowledge management abilities to expand products and markets (Benjamin & Levinson, 1993; Parker, 1995, pp. 332-361).

Expanding investment justification boundaries forces the development of new methods and techniques for investment arguments. Bretschneider (1990, p. 543) argued strongly that the public sector managers have different managerial styles and information needs, hence requiring citation of unique environmental factors in the proposals. As Kraemer and King (1986) pointed out, justifying IT investments can only be understood by understanding the forces that shape decision makers' ideas about how IT can be used.

The majority of the research and practice for cost justification strategies in the MIS field has been in the private sector arena, using for-profit motives and performance

measurement systems (Burgelman & Maidique, 1988; Rubin, 1986). The majority of practicing managers' training in the nuances of managing information systems has not been part of their academic education or practical training (Abdul-Gader & Kozar, 1995; Bacon, 1992). The expansion of information systems across traditional departmental or functional boundaries further complicated traditional accounting and financial formulas for investment rationale (Benson, as cited in Parker, 1995).

The creation of an effective investment argument depends on the organizational environment, the expectations of the decision makers, and the proposal factors. Creating an effective proposal format requires endorsement from the decision makers and depends on biases, cognitive frameworks, time frames, and payback expectations.

Governmental Perspectives on Information Systems

The federal government alone spent over $25 billion on information systems in 1993 (GAO, 1994) and the rate has continued in all levels of government. In the nonprofit public and government sector, measures of performance outcomes, effectiveness, and accountability are significantly different from those applied in the private sector. A private sector organization's performance is evaluated on financial measures, but public sector evaluation is based on fulfillment of program mission. Private sector goals such as market share and profitability are not viable measures for the public sector because of fund accounting structures and different service objectives (Kraemer & Dedrick, 1997; Osborne & Gaebler, 1993). Competition levels for many government services are nonexistent because the government is often a single source provider (e.g., passport issuance, law enforcement, licensing, taxation). However, in a free market economy, many private sector providers are vying to provide government services via outsourcing contracts at a lower cost, threatening the state's employees.

Profits are not calculated in the public sector, because the sources of revenues are not all dependent on the volume of services provided, nor do the fees necessarily cover all the costs. The government cost accounting structure does not directly allocate costs to specific services or production cycles, and product/service features do not determine demand. Services are dictated by legislative or policy fiats (with appropriations), not based on consumer demand or innovation. Increased customer (citizen) demands for (a) quicker cycle times, (b) improved levels/extended hours of customer service, (c) reduced bureaucratic processes, (d) electronic access to data/services, and (e) cross-agency data sharing have increased the pressure on governments to utilize IT in innovative ways. Instead of focusing on the efforts or inputs required to achieve a mission, the emphasis has shifted to achievement of purpose and goals (Osborne & Gaebler, 1993).

As Tapscott stated in *The Digital Economy* (1996), government leaders are faced with using digital media to transform the business of government and change the nature of governance. Leaders are driven by the diametrically opposed forces of increasing citizen expectations for service and the pressure to reduce government spending. Government managers are faced with demands to have zero tolerance for errors because of the impact on society (e.g., releasing a prisoner prematurely, not getting a benefits check to a person who needs it for food) (Kraemer & Dedrick, 1997). Tapscott (1996) pointed out that prior to the printing press, literacy, and the Internet, the models of government service, religion, and governance were fairly well-established. Now the imminent shift in the governance paradigm comes along with the new tools.

Tien and McClure (1986, p. 553) cited the limited effectiveness of information systems in government organization as (a) political concerns, (b) data quality and accessibility, and (c) interface limits across different IT systems. The attitudinal inertia of the majority of managers about sunk investments, the lack of perceived value of information, and the resistance to changing established procedures keeps legacy systems alive (Cash, Eccles, Nohria, & Nolan, 1994). Proponents of sweeping organizational paradigm changes such as Senge (1990) and Osborne and Gaebler (1993) acknowledged the role of information systems in the transformation activities, but failed to adequately assess the challenge of changing legacy systems. Based on interviews with practitioners, Edström (1977, pp. 589-590) determined that outcomes of change actions with information systems were assessed based on the perceptions of the participants, not on objective measures, making it difficult to truly evaluate the results.

Additional technological pressures on government managers include inter- and intra-agency information sharing. In a survey conducted by Pollalis and Frieze (1993), government managers rated the ability to create extra-organizational linkages higher than private sector managers. Government managers are also challenged in hiring highly qualified technical personnel (Hanson, 1998b; Jones & Misenti, 1998). The first finding can be attributed to the need for any governmental entity to communicate with other agencies and the public, and the latter can be attributed to the difficulty government personnel policy constrained organizations have in attracting IT professionals with competitive salary and benefit packages. A recent Gartner Group study reported 10% to 25% of IT positions in governments regularly remain unfilled, with a turnover rate of more than 15% (Hanson, 1998b).

The public sector has two distinct types of organizational structures: (a) job oriented (for centralized functions like accounting and human resources) and (b) functional (for professional specializations like road building or license issuance). Each of these structures utilizes different investment justification models. Job oriented managers look toward improving the efficiency of the processes and reducing error rates with IT utilization. Functional structures benefit from re-engineering of processes by shifting the locus of decision making and facilitating new forms or improved delivery of services (Reschenthaler & Thompson, 1996). Re-engineering processes and their justification becomes more convoluted when the job oriented and functional perspectives come into conflict.

The federal government of New Zealand in the 1980s has been hailed for dramatically restructuring the organization and reward systems to create an efficient and effective government (e.g., passport issuance cycle of less than four hours) (Wistrich, 1992). Transformation strategies included aggressive use of information systems, new accounting methods to reflect assets/liabilities, and establishing accrual based income and expense reporting. Privatizing all but core regulatory/policy/operational functions and putting the senior managers on fixed term contracts with private sector level pay (tied to transformative budget and process performance goals) accelerated the change process. Setting revenue appropriations predicated on a department's ability to supply the information/service (i.e., their ability to serve citizens) increased the pressure to re-engineer processes (Reschenthaler & Thompson, 1996; Wistrich, 1992).

Critics stated that the transformation was only possible because of the relatively small size of the country and the pressure of a severely eroded tax base. New Zealand's

civil service had to evolve from a paternalistic, welfare model to a competitive, privatized, efficiency-driven organization (Mascarenhas, 1993, pp. 319-321). Although the results were admired, the high risk of failure made such a dramatic transformation too frightening for most other politicians (and the downsizing was unpalatable for civil service employees and collective bargaining units). However, information systems played a key role in reducing the processing cycle time and number of civil servants needed.

While the body of theory for justification for investments in IT falls primarily in the literature of the management information systems (MIS) field, there have been few articles specifically focused on MIS in the public sector arena (Bozeman & Bretschneider, 1986; Bretschneider, 1990; Caudle, 1990; Kraemer & Dedrick, 1997; Willcocks, 1994). The MIS literature presented several theories on the failure of proposals and the subsequent failure of execution and implementation (Gilbert, 1996; Maglitta, 1996; Strassmann, 1997c). Other aspects of failure analysis included (a) fund (and lack of cost) accounting for public institutions, (b) economic perspectives on costs/benefits, (c) performance measures, (d) re-engineering of processes, (e) general management practices, (f) accountability for investment, (g) flexibility in service delivery, (h) outsourcing, and (i) political climates (Bretschneider, 1990; Burgelman & Maidique, 1988; Reschenthaler & Thompson, 1996).

Seeking successful investment justification models from other venues has been limited by insufficient private-to-public sector communication channels and fear of media publicized IT project failures. Mansour and Watson (1980) concluded that public sector models are based on very different environments from those in the private sector (p. 525), as did Bretschneider (1990). Perry and Wise (1990) also cited the unique motivational

bases for public servants: (a) genuine conviction about social importance of work, (b) advocacy for a special interest, and (c) a desire to serve the public interest. Government managers have used bits of the private sector investment justification models, despite the goals and performance measures of each sector being very different (Caudle, 1990). In addition to the private sector, other resources for state government were the federal government proposals that had received funding in the past and the base of experience and knowledge from other states (Caudle, 1994; General Accounting Office, 1997).

Public service managers are faced with creating investment justifications that go beyond the basic argument of reduction in clerical work force. Government sector managers have the of difficulty of working within the restraints of civil service and collective bargaining units regulations, procurement procedures, political agenda, and intense media scrutiny. Bretschneider (1990, pp. 536-537) also cited other unique challenges the public sector MIS manager faces compared to private sector counterparts. The public sector MIS manager must deal with a greater degree of review levels, interdependence across organizational boundaries, different economic measures, more external linkages, and MIS executives at a lower reporting level in the organization. This observation was confirmed by Kendrall (1993) in a study of federal government information systems managers. He concluded public sector information systems managers cannot rely on the same priorities for relative importance of information systems issues as the private sector. Private sector managers can cover up mistakes quietly by a write-off to profits, with little risk of media coverage as long as the public is not directly affected (Wilson, 1989). Public sector budgeting is often cast in very short time frames (one or two years). This is far shorter than the life or payback periods of

most IT investments. Strategic directions and priorities can shift with every change of elected officials and appointed administrators. Through an inductive review of failures of governmental IT projects, Rocheleau (1997) confirmed the same factors as did Wilson (1989).

Public sector costs can be divided into production costs (transaction costs for the government, contractors, and citizens required to manage the relationship of the government and the citizens) and bargaining costs (assuming both parties are operating with self interest, but in good faith). Costs are based on task complexity, number of firms vying for the business (contestability), and the asset specificity (physical, human, or site). Benefits are difficult to quantify beyond a baseline of performance expectations (no budget overruns, no harm to citizens, and prudent use of resources) (Globerman & Vining, 1996, pp. 579-581). Benefits do accrue in improved customer service, better positioning for future process improvements, and improved quality of employee work life, but they are very difficult to consistently quantify.

To reduce the dependence on decreasing tax-generated revenues, a new type of funding method for government IT investment has been successfully used. Performance funding is a strategic alliance with a private vendor who provides the up front IT costs and then reaps the subsequent benefits from a portion of the revenues generated by the activity (Mechling & Sweeney, 1998). Revenues result from collection of fines, taxes, and fees. Increasing charges for businesses to access government information electronically (versus paper based) is another method of raising revenues while increasing the level of service. Reduced cycle time of request fulfillment can be surcharged due to the increased benefit to the requestor. The private sector partner may

be more aggressive in pricing for added value and collection than the government, due to the profitability motivation.

Why are governments so challenged to implement information systems to improve their operations and meet their missions? The Center for Technology in Government (1997) offers their list of top ranking barriers: (a) lack of education and information about technology and programs, (b) lack of a shared, reliable computing and network infrastructure, (c) goals that are too ambitious for the resources available, (d) human and organizational resistance to change, (e) unrealistic time frames for completion, (f) organizational/programmatic, technological, and legal complexities, (g) changing priorities, and (h) overlapping or conflicting missions among participating agencies (p. 2). Faced with these challenges, the government manager clearly needs guidance in creating persuasive arguments to fund information systems projects.

In summary, governmental perspectives on IT acquisition and valuation are influenced by the controlling political party, taxpayer demands for efficiency, institutionalizing private sector core values of efficiency and effectiveness, and the measurement tools available to decision makers. The traditional roles and modes of governmental operations are being shifted by the same forces as the private sector: declining revenue sources and increased competition.

State of Minnesota Environment

The State of Minnesota has been committed to the effective deployment of information management technology in the conduct of its activities (Hanson & Fusilero, 1997). Minnesota was ranked in the top fifth of states for use of IT by the Progress and Freedom Foundation and *Government and Technology* (Towns, 1998). The evaluators

gave Minnesota a perfect score in the category of positioning itself for future success. Caudle (1990) cited the efforts of the State of Minnesota in deployment of the information resource management and the mission of "equal access to information within the law, regardless of location" (p. 519, 1994). Osborne and Gaebler frequently cited positive examples from Minnesota's state government in their critically acclaimed book, *Reinventing Government* (1993).

In order to address controlling the perceived potential risk of failure of IT projects through better planning and justification of projects, many state legislatures created a variety of oversight bodies to work with state departments and agencies in planning and estimating the resources needed for successful IT system implementations. For instance, the state of Florida created the Information Resource Commission to serve as a focal point for the IT policy and planning process (Davies & Hale, 1986). The commission was charged with facilitating the change processes for budget review, top management awareness, strategic planning, and human resources skill sets. The State of Minnesota legislature created the Information Policy Office (IPO) in 1987 to oversee IT investments.

The IPO was part of the Department of Administration, but organizationally separated from the centralized computer operations unit, InterTech. One of the IPO's charges was to review all major IT project proposals and requests for proposals (RFP) from 128 state agencies. The IPO also provided an objective assessment of each proposal for compliance with IRM goals to the legislature operation oversight committees, along with recommended levels of funding. The review process was intended to determine potential weaknesses in the sponsoring agency's technological infrastructure and staffing

that could affect the successful completion of the proposed project. The IPO established IRM as a statewide goal for agencies, and provided training sessions for agency staff as well as guideline documents. The IPO also provided research support and policy construction for major state-wide initiatives such as telecommuting or uses for the Internet (State of Minnesota, Information Policy Office, 1994a).

Agencies determine the use of their own budget allocations for internal, small IT projects, but major projects often require special allocations from the legislature. While the IPO has provided a proposal format to the agencies since 1994, IT professionals in the agencies have broadly interpreted the contents of the format (S. Kline-Stensvold, personal communication, February 13, 1995). The Minnesota legislature has two funding cycles within each biennium (one for each session) for allocations and bonding requests. The proposal format has been utilized for the past two biennia (1994-1995 and 1996-1997), and proposals have met with varying levels of success in funding and execution. After agencies protested that the IPO evaluations were invalid, external consultants conducted blind reviews of the proposals. Their assessments were congruent with those of the IPO, thus validating the IPO work. The proposals are also reviewed by the Finance Department, responsible for assembling the governor's budget request, and by the staff supporting the House and Senate committees debating the proposals. The final funding allocation comes out of the Governor's budget (S. Kline-Stensvold, personal communication, Feb. 13, 1995).

The IPO proposed an IRM infrastructure for State IT, and the legislature endorsed it. The IPO then designated six critical success factors for IRM in the proposal format. The factors are (a) executive leadership and involvement; (b) information management

infrastructure built around policies, standards and guidelines; (c) planning that includes agency-wide implementation plans, project plans, cost/benefit/risk analyses, and project scope; (d) high-level information resource models that collectively describe agency function, data, data distribution, and technology; and (e) an organizational structure that manages all aspects of the organization's information resources and effective skills base within the agency (State of Minnesota, Information Policy Office, 1994a).

Efficiency in Government

What keeps the government from operating more efficiently despite the continuing complaints from taxpayers and repeated attempts at reform? The most compelling reasons are (a) the lack of incentives to be more efficient because funding is not directly related to the transaction revenues (e.g., government monopoly on regulatory services such as issuing driver's licenses), (b) the personnel cost structure of civil service and collective bargaining units, and (c) the political objections to re-engineering projects that mandate wide-scale changes (Globerman & Vining, 1996, pp. 581-585). High power incentives are provided by market transactions in which efficiency gains come from a specific transaction flow between the parties involved (e.g., selling a widget after building it). However, the majority of public sector incentives are low powered because they are based on transactions in which there is no specific benefit to the parties involved. For instance, a citizen completes the forms to set up a business to comply with a bureaucratic decision to require the forms, but neither the firm nor the form processor directly benefits from the transaction (Frant, 1996). If there is no correlation between rewards and productivity/innovation, productivity will be less (Alchian & Demsetz, 1972). Human nature is such that most humans will choose actions based on high

powered personal rewards (tangible or intangible) instead of low powered organizational benefits.

The Center for Technology in Government (Albany, NY) presents more reasons for government resistance to change in *Tying a Sensible Knot: A Practical Guide to State-Local Information Systems* (1997). The changes in government operations are being created by public demand for cost-effective and user-friendly services, devolution of authority from federal to state levels, and voluntary participation in state initiatives. The barriers to meeting these challenges via the use of information technology solutions include (a) the lack of decision makers' knowledge of information technology; (b) the lack of a shared computer network infrastructure; (c) goals that are too ambitious for available resources, unrealistic time frames; (d) organizational, programmatic, technological, legal complexities; (e) changing priorities; and (f) conflicting missions. While privatization is often offered by public sector critics as the alternative for overcoming the governmental barriers, Menzel (1997) argued effectively that privatization is not the panacea for providing the incentive to change, because it lacks the critical ethical component and can create opportunities for corruption and greed.

The most powerful incentive for public sector change comes from outside the public sector, because citizen expectations create push type leverage for public services. The Forrester Group (Dolberg, 1997) described the push for information technology as being created by the desire for business information content and the means of delivery of information. The levers are workers who need content streams that are ready for action, available immediately, and unedited. Workers need this information to allow them to take specific actions and make decisions to shorten response times and slice through the

clutter surrounding service delivery (Dolberg, 1997; Osborne & Gaebler, 1993; Wilson, 1989). Nolan and Croson (1995) stated the strategic advantages of using IT include (a) empowering knowledge workers, (b) building linkages across functional systems, (c) reducing paperwork, (d) serving geographically dispersed markets, and (e) competing with time and knowledge. The goal of re-engineering governments is improving the effectiveness of services provided (Drucker, 1995). Government managers are impelled to find better ways to fulfill their missions, or the functions will be outsourced or privatized; or worse yet, their failures will be publicized by a headline-seeking reporter.

While Pasmore (1988) defined organizations as legal fictions that were created to accomplish what a single individual cannot, open systems thinking forced a reality test. Bureaucracies are not effective due to relying too much on supervisory controls, maintaining the status quo, undervaluing staff, and paying too little attention to outside forces. Kiel (1997) proposed incorporating chaotic logic to generate a new paradigm for governmental operations and organization. Moving from a maintenance model to a transformative model requires an understanding of the systemic interrelationships of small changes as levers to larger effects (Senge, 1990).

There are fundamental differences in the personal motivation of private and public sector employees. High powered rewards are incentives provided by market transactions in which efficiency gains from a specific transaction flow to the party involved in producing the results (e.g., bonuses for sales achievements). Low powered incentives are more common to the public sector in which doing a good job does not directly result in recognition or reward, nor does doing a job poorly necessarily result in personal or institutional failure (Frant, 1996). Threats of elimination or outsourcing of departments

are motivating public servants to produce excellent service, without high powered rewards. Departments can be downsized through automation, re-engineering, and reorganization as they were in the New Zealand transformation.

Bozemann and Bretschneider (1986, pp. 478-481) cited models of publicness that differentiate the characteristics of the public sector from the private sector. These factors included (a) economic authority, (b) political authority, (c) personnel and personnel systems, and (d) work context. The first two characteristics are aspects of a distal environment and the last two are proximate in the sense that they are particular to certain types of organizations and influenced by the distal factors. The characteristics of private sector organizations are (a) profit incentives, (b) willingness to take risks, (c) cost/activity based accounting, (d) intense global competition, (e) revenues linked to sales, and (f) bonuses and performance rewards. Public sector characteristics are (a) mission fulfillment incentive, (b) low risk tolerance/high risk aversion, (c) no cost measurement systems, (d) limited or little competition, (e) revenues decoupled from transaction volumes, and (e) fixed civil service salary structures. With these almost diametrically opposed operating paradigms, it is understandable that not all private sector methodologies translate effectively into the public sector environment.

Bozeman and Bretschneider (1986) cited the dearth of research into theoretical frameworks for public sector information systems, and relatively few other MIS researchers since have published studies in the public sector. While they pointed out the lack of MIS studies in the public sector, they did not speculate why. King and Kraemer of University of Southern California Irvine have been contributors in both the private and public information systems literature and have expanded their research into other

countries' use of information systems (Dunkle, King, Kraemer, & Lane, 1989; King & Kraemer, 1985; Kraemer, Andersen, & Perry, 1994). They have observed that the pressures on U.S. governments for transformation are world wide, as did Willcocks (1993, 1994) and Wistrich (1992). The public sector requires IT research specific to the unique environment presented in nonprofits and governments in order to advance the effective use of IT.

Accounting-Based Evaluation Methods

Accounting-based investment evaluation methods appeal to decision makers who are motivated by bottom line measures. Manipulating quantititive data provides a specious assurance of reliability for the decision maker who does not investigate how the quantities were derived in the first place by the estimators. The decision makers must define common estimation methods and inclusion/exclusion guidelines in order to receive consistent measures for comparison.

The most commonly used method for rationalizing an expenditure is return on investment based on estimates of quantifiable costs and benefits (Ballantine & Stray, 1998, p. 8). Other accounting-based methods include (a) payback rate, (b) annual internal rate of return, (c) internal rate of return, (d) net present value, and (e) return on management productivity. Whatever accounting method was used, the proposer had to determine how long it would take for the accrued benefits of the solution to outweigh the initial acquisition investment. Stating future returns in terms of today's dollars, compared to today's investment costs with discounted cash flows, can be calculated with net present value (NPV) or internal rate of return (IRR) techniques. Ballantine and Stray (1998, p. 5) noted that few of the published empirical studies on capital investment appraisal techniques supported the unique characteristics or benefits of IT projects. Willcocks

(1993) thought that NPV was superior to IRR but cautioned that all cost benefits should be used with care as they ignore risk and are based only on estimated values. Willcocks (1994, p. 22) convincingly argued that different purpose IT systems needed different strategies for applying ROI concepts. ROI, NPV, and IRR techniques also assume that a consistently applied cost accounting system is in place, which is not true for public sector organizations.

Use of ROI, IRR, and NPV calculations assume a static business scenario with only automation of simple tasks, and they cannot address the impacts of truly transformational (re-engineering) enabling technologies (Moad, 1995). Maglitta (1997) criticized traditional ROI methods for not measuring the alignment of the outcomes of the project with corporate goals. Rather than relying on metrics using only hard dollars, he recommended using a combination of business value-added measures, with executive support of intangible benefits stated in present value terms.

Benson (in Parker, 1995) introduced the concept of *information economics* to replace traditional ROI techniques. He derived it from an Oracle Corporation technique called CB-90 (i.e., Cost/ Benefit analysis for the 1990s). The CB-90 technique incorporates both end user perceptions and IT estimates of the tangible costs/benefits, the intangible benefits, and the risk analysis for each option with points assigned to each factor. The supply and demand concepts of economics are applied to the financial analysis. The proposal evaluation team creates an evaluation matrix of the point values of each aspect using ROI and business value analysis procedures. The consensus building process that occurs during the point assignment discussions serves to educate the team

members and creates a common understanding of viewpoints (LaPlante, 1994; LaPlante & Alter, 1994; Semich, 1994).

The challenge of employing ROI evaluation techniques on IT-based projects that do not provide a value-added functionality or products is even harder. For instance, retrofitting old program code to allow the correct handling of the dates in 2000 did not provide any distinct competitive advantage. The return was that it allowed the organization to prevent operational disruption (Jones & Misenti, 1998). The worth of the correction was stated not in terms of competitive gain, but rather as protection against potential losses from the inability to continue operating (Crowley, 1997). While ROI is broadly used and thought to be consistently understood, it has significant limitations as a sole investment justification argument. Stockslager (1987, p. 15) stated that the flaw of cost justification is the marginalizing of environmental factors and human satisfaction that are improved through the use of IT. Managers ignorant of the broad results of effective IT use will fall back on management by numbers.

Creating commonly accepted quanitifications is the flaw of accounting-based techniques. Framing acceptable cost and benefit estimates relies on perceptions of appropriate time boundaries. In addition, cost tracking systems for software development often "leak" by not capturing the total costs association with training, lost productivity, data conversions, hardware upgrades, and errors. Function point metrics and activity based cost (ABC) accounting methods have been proposed as solutions, but these have weaknesses of their own (Jones, 1997). As a technique, cost benefit analysis has been criticized for not telling the whole story of spending on IT, because it originated in the industrial era when labor cost savings were the primary driver of decision making

(Semich, 1994). The State of Oregon (1995) produced a specific CBA methodology, and it went through four revisions between 1987 and 1995.

A 1994 survey of 365 various sized organizations by the Standish Group showed that project estimates are not successful. Over half of IT projects cost twice the original estimates, almost one third were never finished, slightly more than 15% were completed on time and within budget, and almost half of the information systems executives thought there are more project failures now than 5 years ago (Zells, 1997). Lederer and Prasad (1992) found similar results in their survey of 115 firms. They raised the provocative and unanswered question of who is ultimately held accountable for making the original faulty estimates of costs and benefits. The MIS case study literature offers hindsight of what went wrong with projects (Rocheleau, 1997; Symons, 1991; Willcocks, 1994), but few organizations have taken the time to consistently complete the last reflective review step of the classic systems development life cycle (SDLC) (Parker, 1995, pp. 306-307). The last SDLC stage is an objective postimplementation review. Failure's definition is in the eye of the beholder, and opinions can vary widely depending on who was interviewed and at what point in time (Edström, 1977, pp. 589-590). Since most IT projects are late and over budget, few organizations are interested in doing a critical self-examination (Holmes & Poulymenakous, 1995).

Because of the media scrutiny of the Statewide Systems Project, the Minnesota State legislative auditor's office investigated the project's cost overrun. The ambitious project integrated the state's procurement, payroll, accounting, and human resources systems. The auditors found the costs increased due to unexpected complexity and added functions. The new system was expected to do much more than the previous systems and

the costs savings were over projected. Users became more satisfied with the new system over time as they learned how to use it (State of Minnesota, *Statewide Systems Project,* 1997).

Managers have found that it is often difficult to demonstrate added value from the analysis failures if the organization does not consciously create a base of experiential best practice knowledge to advise future projects (Rocheleau, 1992; Wen, Yen, & Lin, 1998). All too many private sector organizations simply chose to take the approach of firing everyone responsible for the failed project and writing off the loss, without analyzing the failure and contributing to the internal pool of knowledge about successful project management techniques (Kumar, 1996; Mansour & Watson, 1980).

In the public sector, failed project write-offs often make media headlines and bring negative criticism and publicity to the public officials for misuse of public funds, engendering a highly negative incentive for taking any risks on IT projects (Bozeman & Bretschneider, 1986). Rocheleau (1997, pp. 6-17) acknowledged that the definition of failure depends on the individuals. A report by the Center for Technology in Government (1997) cited a variety of reasons for public sector failures. The reasons included (a) purchasing processes of public sector, (b) project development process, (c) inadequate training, (d) personnel issues, (e) poor data input (i.e., garbage in, garbage out), (f) unwillingness to share information across functional areas, and (g) insufficient payoffs.

There are costs applied to achieving quality standards (e.g., inspections and record keeping) that provide far-reaching benefits of improved reputation, certifications for the firm, and preventing nonconformance or rework. Unfortunately, a standardized model for

measuring these costs and benefits is not in use (Carr, 1992, p. 72). Opportunity costs arise from not investing in new technologies and losing the accompanying leverage, thus delaying the potential payback. The missed opportunity costs can only be estimated (Freund, 1990).

Nonfinancial Based Methods

Congruence of projects with the mission/strategic plan of the organization as a driver, or as a building block, is a common justification measure. However, it falls under the category of the risk of not investing in a project. True transformative re-engineering efforts cross all functional boundaries within organizations. To be effective, the efforts must be driven from the senior executives throughout the entire organization (Senge, 1990). Since the re-engineering result will be so radically different from the original way of doing business, there is no accurate benchmark from which to measure improvements. With many of the tasks being eliminated, newly created, or shifted in locus of control, an organization-wide view must be taken of the costs and benefits, or the subunits would present very skewed cases.

Radically transformative projects are very difficult to achieve in public settings (the most visible exception being New Zealand's federal government) (Hammer & Champy, 1993; Mascarenhas, 1993). Northrop, Kraemer, Dunkle, and King (1990) reported that a study of 46 cities over a 12-year period showed that most IT investment payoffs take years to meet original estimates and paybacks. Information access and management control was perceived to have improved (Northrop et al., p. 508). Operational efficiencies came in the high volume task sets (Northrop et al., p. 509). Future payoffs were expected in better public interaction, information retrieval, and cost avoidance, but these are all difficult to estimate with any degree of accuracy (Northrop et al., p. 512).

Knowledge workers present a new management paradigm for determining the value of information outputs. Chew (1988) argued that it was essential to measure productivity appropriately. He cited the need to focus on overall capacity, not on one set of costs. He demonstrated that unless changes in work tools and paradigms take the entire organizational system into consideration, work is simply shifted from one unit to another without a net gain. He referred to a better solution as a multifactor view of processes including humans, machinery, production cycle time, facilities, and customers. Implicit in this premise is that the manager has an understanding of the holistic nature of the organization. Hammer and Champy (1993) and Davenport (1993) addressed measurement techniques and acknowledged the challenge of coping with existing financial and reward systems.

According to Erik Brynjolfsson, MIT Sloan School of Management, the greatest payoff from IT investments comes from intangibles such as improvements in quality, timeliness of responses, and better customer service through knowledge-empowered employees (1993). He estimated that IT has added .5% (or about $40 billion in aggregate output) to productivity growth in the U.S. economy in the 1990s. An opposing view is presented by Kirkpatrick Sale, who thought that so much effort had been expended on training, upgrading hardware/software, and adapting processes to fit new tools that it offset any gains in productivity (Hoffman, 1997, p. 1).

Linking productivity measures to the strategic plan of an organization is equally as important in the public sector as in the private sector. Drucker (1995, p. 52) castigated the U.S. government for not having continuous quality improvement and performance benchmarking, but he admitted to the difficulty in transforming employment agreements.

The essence of creating appropriate performance measures and incentives lies in defining what is counted and whether those measures truly reflect the fulfillment of the agency's mission. Many public sector managers are uncomfortable with the paradigm value shift to measuring outcomes instead of effort, but taxpayers and watchdogs have been overwhelming in their support for accountability for results. After convincing public sector managers to create performance measures and monitor achievements, the next step is creating performance based budget allocation. Many state agencies reported that the budgeting process was shortened considerably when they were able to demonstrate the results from the investment of legislative funds (Walters, 1997).

Behn (1997) cited the application of the performance priority setting recommendation of James Q. Wilson, termed "fix the broken windows first" (i.e., one broken window begets more because there is no evidence of anyone caring about the windows). The concept recommends addressing performance that is highly visible and prevents future problems. The city transit police in New York were rewarded based on arrests (after the crime), but the reward measures were redefined as prevention. Significantly reduced crimes, panhandling, graffiti, and public fear have been given credit for increasing New York tourism to unprecedented heights (Behn, 1997). IT system investments can address visible problems in service delivery such as cycle time reduction, speedier delivery, and value-added information.

Kaplan and Norton (1992) presented a holistic investment justification technique called the balanced scorecard in *Harvard Business Review.* It generated attention, articles, and a book (Kaplan, 1994; Kaplan & Norton, 1993, 1996). The balanced scorecard concept drew on the internal financial measures of past performance, and

"...complements them with operational measures on customer satisfaction, internal processes, and the organization's innovation and improvement activities. Operational measures are the drivers of future financial performance" (Kaplan & Norton, 1992, p. 71). The model is based on the integration of four fundamental perspectives: (a) customer, (b) innovation/learning, (c) financial, and (d) internal. This approach broadens the sources of data for decision making to provide a holistic picture of the situation, and reduces the possibility of selecting a sub-optimal solution. One of the key features is that it puts strategy, not control, as the driver of the decision and data presentation (Kaplan & Norton, 1992, p. 79). The balanced scorecard also expanded the dimensions of the justification outside the limits of internal, backward looking measures. Garrity and Sanders (1998) also advocated an integrated set of perspectives for evaluating IT success.

Without performance benchmarks, an organization will find it difficult to determine the value of adding an IT component to a process or re-engineering effort (Belcher & Watson, 1993). Private sector organizations may find it easier to create new team structures and incentives to reward change, but experience showed that without fundamental systemic change, small changes are only patches without lasting value. Drucker (1995, p. 54) referred to this process as "amputation before diagnosis." Within the public sector, the additional change barriers of collective bargaining units, civil service regulations, and entrenched bureaucracies make it even harder for radical transformations. Creating meaningful performance measures for evaluation of processes and performance are critical precursors to using a new IT investment justification tool.

In executive decision making, the most common questions are about ROI, competitive advantage, cost, and the risk to project success. Holmes (1988) found in a survey of managers that the risk of IT projects was valued only marginally higher than competitive advantage and ROI. Holmes and Poulymenakous (1995) argued that rigorous evaluation can mitigate the likelihood of failure but cannot control for every potential flaw. In the private sector, the write-off of a project can be hidden in a profitable year, barring reporters from publicizing it. However, the fear of risk-taking in the public sector is not just about low-return ventures and negative publicity, but rather is grounded in the public mission of ensuring that prudent decisions are made to utilize tax dollars (Osborne & Gaebler, 1993).

Failure Risk

Risk is an overriding concern for all project proposals. Government IT professionals and legislators have painful memories of failures that resulted in intense media scrutiny. The negative consequences of failure spur legislators to carefully examine risk and prior failure reasons in all proposals. Rocheleau (1997, p. 5) provided a taxonomy for study of the failure of public sector IT projects and provided a guide for decision makers to ask about potential risks in projects. Rocheleau did not offer solutions, but instead provided a starting point for analyzing failures in order to improve future performance. He categorized the failure reasons as (a) purchasing processes, (b) development processes, (c) inadequate training, (d) information overload, (e) poor data quality, (f) data sharing obstacles, (g) inadequate payoffs, (h) verbally rich data prevailing over digital data, and (i) poor data management. Analysis of failures demonstrates an organizational commitment to improving future project success through learning from past experiences.

Willcocks (1994, p. 20) cited three categories of risk in the public sector: (a) waste because of incompetence, (b) malversation problems from abuse by public officers, and (c) catastrophes of socially created disasters. He added a fourth risk of the public sector, not being able to obtain the needed technical personnel to execute the project. With the scrutiny that all public sector use of funds comes under by the media, it is understandable that most public managers are reluctant to be early adopters of any technology or untried techniques. There are other risk areas that present unique problems in public service beyond those cited by Willcocks. Uncertain long run funding, short budget cycles, highly regulated/inflexible procurement procedures, multiple stakeholder linkages (all with divergent opinions), and a lack of alignment between organizational goals and system objectives add to the challenges (*Making Smart IT Choices*, 1996).

In contrast to organizational risk factors, Nedovic-Budic and Godschalk (1996, p. 555) itemized the socio-technical perspective of risk factors, based on examining case studies, as follows: (a) perceived value of relative advantage, (b) personal values and beliefs, (c) computer experience and anxiety, (d) perceived complexity, (e) exposure to innovation, (f) communication behaviors, and (g) attitude toward work changes. They concluded that the most essential factor was perception of personal benefits, which should motivate change managers to invest time in selling the change to individual employees. New information systems that cross jurisdictional areas within a state government and require cooperation with adjoining states entail a tremendous amount of negotiation to ensure success (Pasmore, 1988). Massachusetts wanted to expand its scope of tracking employment records to surrounding states to seek out-of-state noncustodial parents who were behind on child care payments. It took several years of negotiation to

implement, but it has resulted in increased payments being captured via wage garnishment in several states (*Making Smart IT Choices*, 1996).

Software project risks include difficulty in accurately estimating costs due to uncertainty of goal definition, personnel problems, poor project management, and incomplete specifications (Mahmood, Gemoets, & Jacquez, 1996). The estimation phase is often completed during the early honeymoon period of a project when all parties are sure they will get exactly what they have in mind (but have failed to fully articulate). When the finished product does not act or look the way they expected, the project is deemed to be a failure. Estimates may also be completed long before the actual funding is received, further skewing their accuracy (Stevens & LaPlante, 1986).

Another form of risk is attempting to meet unrealistic, imposed deadlines without an opportunity to change the implementation date (e.g., tax deadlines, college registration periods). Rushed project managers often cut time for testing and training, resulting in the rollout of a system that does not work well at all, thus engendering the risk of negative publicity from frustrated users (Stokes, 1991). Being the first to use a software or hardware product may present a window of competitive opportunity for a private firm, but governments do not have sufficient competition to warrant the risk potential. Nedovic-Budic and Godschalk (1996, p. 564) found that increased exposure to and experience with technology positively correlated to the success of the projects.

An important but rarely articulated risk that needs to be addressed is the potential of more than one high risk situation occurring at the same time. The net effect of convergent problems in a project portfolio can be greater than the sum of the parts. A single body assessing convergent risk is rarely in place in organizations. The project

champions must make the risks known, while at the same time trying to sell the hard and soft benefits of the project (Gilbert, 1996). The corollary approach to reduce risk is to increase the likelihood of individual project success by breaking large projects into smaller chunks (Hanson, 1998a; Maglitta, 1996; Melymuka, 1998). Failures of massive systems that proved unwieldy and uncontrollable spurred the investigation of the correlation of project success rate to project size.

In addition to apprising decision makers of the potential risk of projects, project champions also need to let decision makers know the costs of not proceeding with opportunities. Realistic assessments and contingency plans for possible problems are necessary to encourage critical thinking about the project justification assumptions, arguments, and performance measures. Gilbert (1996, p. 14) warned that project managers who consistently bring in projects successfully will not necessarily be rewarded, but instead scrutinized for padding estimates. The project manager walks a fine line between appearing overly enthusiastic or being branded as a doubter by pointing out everything that could possibly go wrong.

The lengthy list of potential risks should not deter public sector managers from pursuing the utilization of IT, but it should rather serve as a cautionary base of experiential knowledge. The consequences of failure are so high that managers would be remiss not to cite them or plan for contingencies if problems arise. Public sector managers do have some project constraints that are different from those in the private sector, but there are more common risk factors (Rocheleau, 1997; Symons, 1991).

Congruence of IT and Organizational Strategy

The value of long-range planning has been recognized by most organizations over the years (Hohn, 1986); however, many public sector managers feel attempts to do long-

range strategic planning (both at the subunit level and for the entire organization) are futile beyond the next governor's election. This is because of the very real concern about having key political appointees replaced and their successors bringing new ideas and agenda. New people bring new agenda and strategies.

The strategy of the organization drives the priority of IT development projects. Accomplishing true innovation in IT usage requires building the long-term plan for organization wide information architecture first, then constructing the building block systems. Individual agencies may have internal strategic plans but need resources or cooperation from other units without similar plans, making negotiation difficult (Towns, 1998; Wildstrom, 1993).

Brynjolfsson, Renshaw, and Van Alstyne (1997) presented a compelling argument for understanding the complex interrelationships among technology, practice, and strategy. They created a change planning matrix for managers to use in the identification of critical interfaces and to ensure that process change effects are positive. The matrix included internal and external stakeholders' opinions about the changes to emphasize potential difficulties. Expanding the stakeholder sets to include the taxpayers, the business community, the technology vendors, and the IT community is necessary for a complete assessment (Curle, 1993). Rockart and Hofman (1992) mandated including IT in the early planning stages, but the prejudice against IT in the executive ranks is persistent (Senge, 1990).

In order to move out of a reactive mode, an entire organization must work to use to a proactive and integrated approach to IT portfolio assessment and planning (Davies & Hale, 1986). Subunits of public sector organizations may feel they have to plan

individually in reaction to overarching goals of the entity, but instead they should be involved in setting the entire organization's plan. Presenting the individual projects as part of a larger portfolio creates an evaluation context. Critical building components are more easily understood and identified in the larger context (Adler, McDonald, & MacDonald, 1992).

In examining an organization's value chain (Porter & Millar, 1985), the public sector manager is faced with expanding traditional boundaries. Fulfilling the legislative mission can vary widely from recipient to recipient of the service. Justifying the use of IT to achieve a mission, as well as improving customer satisfaction, often requires a larger process re-engineering effort. Re-engineering efforts have resulted in dramatic costs savings in the private sector (54% in manufacturing and 68% in all types of businesses) (Wildstrom, 1993). In the public sector, re-engineering efforts are made more difficult by the layers of entrenched civil service and collective bargaining contracts, as well as resistance to change. The opportunities for cost savings are possible as demonstrated in the federal government of New Zealand (Mascarenhas, 1993). IT is a powerful catalyst in increasing the production capacity of human resources, because it can replace the routine work and make better information available for decision making. Increasing absorptive capacity is difficult to quantify, but is a meaningful measure of payback (Koulopoulos, 1991).

While the public sector manager has not always had the ability to do long range strategic planning, the imperative to improve services and perform more effectively requires a strategic context for investment justification. The long-term payback reality for IT investment also mandates long range planning for related organizational changes from

re-engineering. Whether IT development drives strategic planning or vice versa because they must be done concurrently to leverage the power of each and achieve synergistic benefits for the organization.

Summary

The value of an IT proposal lies in its ability to convince decision makers to invest in it. Decision makers are influenced by their own biases about the value of information, the basis of the types of costs and benefits, the quality of the presentation, the rewards for improved performance, the organizational constraints, and the risks of success. A wide spectrum of IT investment justification techniques has been used in the private sector with varying degrees of success, and many of these techniques have been adapted to the unique needs of public organizations. A thorough understanding of the strengths and weaknesses of each technique is necessary in order to determine the most appropriate combination of techniques for public sector entities. Accounting based techniques are limited by existing measurement systems and the accuracy of estimates used. Many significant intangible costs and benefits cannot be easily fit into accounting-based models. Using consistently applied techniques for categorization and estimation of risks and soft costs/benefits increases the acceptability of the estimates for the decision makers.

Understanding the different perceptions and biases of the major parties involved in preparing and approving the proposals is critical for constructing effective arguments. Personal incentives, IT knowledge, organizational experience, and risk comfort varies by individual. Establishing common understanding of terminology, estimation methods, and expectations is critical. The ideal public sector justification methodology should reflect

all the components that are needed by the decision makers and emphasize support of the organizational mission.

Expanding the investment analysis to include the entire life cycle of the system and address second order effects provides a more realistic projection of a project's total costs. Preparing investment cases with multidimensional data (i.e., the balanced scorecard approach) is the backbone of a successful proposal. Strategic fit, risks to success, external needs, innovation, and opportunity costs are all critical components of effective investment cases. Integrating all the aspects of evaluating investments is complex, but necessary, for successful organizational development and growth in what Argyris calls generative learning (1982). *Double loop* learning looks backward at what worked in the past and forward to new challenges and opportunities. Generative learning challenges the egos of decision makers who are not used to reflective, critical analysis processes. As quickly as technology capabilities change, the methods for justifying the investment must also change. Public sector managers can adapt new investment justification techniques that have proven successful in the private sector, after understanding the critical factors in the public sector.

Chapter 3
Methodology and Design

Introduction

The researcher studied the State of Minnesota's major IT proposal construction, evaluation, and funding results for two legislative funding cycles. The descriptive study design is based on content analysis of the proposal documents, supported by interviews with a sample of the key people involved in the process. The content data and the interview data were examined for significance and relationships. The documented evidence of the past is the written agency proposals, but the political and verbal influences have not been recorded. The success of the past proposals in securing full funding was determined through budget records. The opinions of the key decision makers were obtained via structured interviews. Comparing the decision makers' expectations to the proposal format provided insights for suggested modifications to the proposal contents and evaluation process.

Research Design

Research in the public administration academic and practitioner sectors has taken a variety of forms, with several styles most frequently used. In a survey of 7 years of public administration doctoral research, White, Adams, and Forrester (1996) reported that about one-fifth of the dissertations were practice research, and the most frequently used method in planning and public administration dissertations was case studies. This finding was supported by another 1994 study cited by the authors, in which Adams and White found that public administration dissertations were more likely to do practice research, have a foreign focus, or be a case study (White, Adams, & Forrester, 1996, p. 448). While the authors did not speculate on the reason for this, one possibility is that only a small degree

of theory easily translates across uniquely different governmental forms. Case studies, content analysis, and practice research provide the opportunity to focus on specific situations. Designing a descriptive research study of the State of Minnesota IT proposal documents and funding process presented an opportunity to evaluate the past effectiveness and audience needs.

In the published research about the human factors that affect the choices for IT, the data collection techniques were frequently based on surveys (Bretschneider, 1990; Stevens & LaPlante, 1986) and structured personal interviews (Bacon, 1992; Bajjaly, 1993; Edström, 1977; Kendrall, 1993; Rocheleau, 1997). Interviews with practitioners extract experiential knowledge from which researchers can derive a baseline. Another technique is to evaluate subjects in controlled experimental laboratory settings (Shangraw, 1986) by asking the participants to make decisions on hypothetical cases. Serafeimidis (1996) stated that the literature and practice of IT evaluations have been based on rational/objective perspectives. However, using positivistic paradigms and scientific methods for evaluating information systems are unsuitable because of the nature of the evaluation and the social nature of the information systems (pp. 185-186). The solitary focus on monetary capital analysis ignores the human costs and benefits resulting from IT system implementations (Pasmore, 1988). This observation was also supported by Fitzgerald (1998) and Kaplan and Norton (1992). While much has been written on the topic of justifying IT investment, there has been little published research that utilized data-based investigative and evaluation techniques. No published validated evaluative instruments of cost justification methodologies or proposal format

effectiveness were found. This research project focused on determining the strength of the correlation of the aspects of the proposal to the success of obtaining funding.

The researcher chose to use a two-part descriptive research design. The first part assessed the quality and completeness of each proposal document and determined the level of funding recommended by the IPO and granted to each proposal by the legislature and governor. Two recent funding cycles were chosen because the proposals used similar formats and many of the key individuals involved with the proposal process consented to the interviews. The researcher conducted a content analysis of each of the six sections of the advance planning documents (APDs) for presentation quality, completeness, content quality, positioning, and citation of risk/strategy factors. These aspects were selected based on the theories about proposal content proposed by Benjamin and Levinson (1993), Chung-Yuang (1989), Newcomer and Caudle (1991), Parker (1995), and Perry and Wise (1990).

The second part of the study gathered the opinions of the key proposal generators, reviewers, and legislative decision makers. The researcher used the proposal evaluation aspects of Bacon (1992), Classe (1997), and Parker (1995) in framing the interview questions because no published survey instrument on proposal process evaluation was available. The researcher employed the in-person structured interview technique over mail distribution to obtain a higher response rate, reduce misinterpretation of questions, and allow flexibility to follow up on additional information volunteered (GAO, 1991). During the interviews, the researcher noted the respondents' open-ended responses and probed with more questions that evolved from the commentary. The respondents'

observations and evaluations about the proposal funding process and proposal components were recorded.

The key individuals in the IT proposal generation, review, and funding processes were fewer than 50. The convenience sample of 25 consisted of those who agreed to be interviewed from the major agencies, IPO staff, OT staff, legislative auditors, and legislator/staff members. The individuals interviewed had their survey responses and additional comments noted; however, there was no speculation on their motives, prejudices, or political aspirations by the researcher.

As a result of this research project, the researcher found that some aspects of the original proposal format were positively correlated to being fully funded. The results of the interviews were used to recommend additions and changes to the investment justification model. The original IPO proposal format model with six IRM aspects had been modified slightly for proposals for the 1998-1999 funding biennium, to include alignment with the organization information resource plan, organization wide implementation schedules, and Year 2000 compliance (*Information Resource Plan Budget Request Guideline*, 1996).

Population and Sample

The managers of the Information Policy Office and the Office of Technology gave the researcher permission to analyze the content of the APD proposals that were reviewed by the IPO. The IPO/OT managers were very interested in having the data analyzed to provide data-based guidance. The major IT proposals from two biennia (1994-1995 and 1996-1997) of the State of Minnesota were archived by the IPO in the public domain. The APDs represented the proposals that had been reviewed by the IPO and submitted for legislative evaluation. Very poorly done proposals were returned to the agencies before

the formal review process, and some APDs were pulled from the process by the agencies prior to IPO and legislative review. This funding period was selected because the proposals all used the same format and were evaluated by a consistent team of IPO professionals. Each APD was analyzed for presentation format compliance, quality, completeness, and content by the researcher, and the results were coded. The requested funding, the funding recommendations of the IPO, and the funding eventually granted by the legislature/governor were documented and are included in the analysis.

Fewer than 50 people were involved with the generation, review, and approval of major IT proposals. The sample was limited to those who agreed to participate. The researcher interviewed 19 individuals (with alternative e-mail and paper mail responses used for 6 more individuals who were unavailable for personal interviews but still willing to participate). The individuals work(ed) in the major state agencies, the Information Policy Office, the Office of Technology, the governor's budget staff, and the House and Senate committees on information technology expenditures. There has been turnover in staff and elected positions since the time the proposals were evaluated, but many of the individuals involved with the proposals still worked within the State of Minnesota and were willing to be interviewed.

Subjects

Interviews with the individuals did not create any threat or harm to them, as their comments and responses were not identified by name in the paper. The individuals volunteered to participate, creating a convenience sample biased by their self selection. Because the group was so small, they already knew each other through working together. The interview analysis does not criticize the individuals interviewed, but does it cite educational opportunities.

Instrumentation and Data Analysis

The researcher was unable to locate any published academic instrument that utilized a statistically validated interview or proposal coding instrument that could be adopted. The literature provided a theoretical basis for the analysis of segments of proposal arguments, but no congruent evaluation models were documented. The researcher utilized Fitzgerald (1988) and other researchers' recommendations for important proposal aspects to derive an evaluation instrument for the content of the existing APDs. Fitzgerald (1988) recommended citing the proposal purpose (e.g., efficiency, effectiveness, mandatory compliance, infrastructure, or research investments). The dimensions of ideal proposals should include (a) the full set of costs including hard and soft estimates, as well as technical and end user department costs; (b) contribution to organizational strategy; (c) analysis of benefits (hard and soft) with confidence in the estimates; (d) stipulation of second order effects on roles, relationships, sources of power, and organizational structures; (e) evaluation of flexibility over time of use; (f) practical implications and probability of implementation; (g) degree of risk engendered by the project; and (h) testing the proposal's assumption and assertions in a practical way. Second order effects are the changes for the individuals in the organization whose work flows, interpersonal communication channels, and reporting structures are altered as a result of the new information system (Fitzgerald, 1998, pp. 17-25).

The presentation quality of the document creates an impression on the decision makers of the originating agency's acumen and abilities (Parker, 1995). The funding received by each proposal is a tangible measure of success. Newcomer and Caudle (1991, p. 377) cited the difficulty of finding any evaluation guidance for public sector decision making, also noted by Bozeman and Bretschneider (1986). Newcomer and Caudle

recommended public sector proposal evaluation formats that were comprehensive, included all potential users, not limited to quantitative or qualitative measures, included improvements in decision making, used both internal and external opinions, and were iterative in nature.

All state agency proposal writers were provided an IPO recommended proposal format that addressed six IRM constructs along with instructions on how to complete each section (S. Kline-Stensvold, personal communication, February 13, 1995). Word processing tools were available to every agency. The eventual proposal presentation quality, thoroughness, and content were decisions of the agency that submitted the proposal. The amount of time invested in each proposal's investigation and preparation varied by agency management choice.

A Likert-type scale was used by the researcher to rank the contents of each proposal section and the presence of specific components (e.g., citation of risk, justification of soft costs). The researcher's more than 25 years of experience in the MIS field as both a preparer and evaluator of IT investment proposals formed the basis for her proposal evaluation competence. With only one evaluator and one proposal format, the instrument was consistently administered; however, the reliability could not be tested on different data sets due to the limited number of available proposals. Techniques to test reliability including retesting later in time, using Cronbach's alpha coefficient, or using a second evaluator were not feasible for this project. The proposal format was unique to the State of Minnesota's specifications, and the researcher's format for evaluating the proposals was reviewed for validity by two outside evaluators (each with over 25 years of MIS experience) as well as the dissertation committee. The outside evaluators also

reviewed a sample of the researcher's proposal evaluations and concurred with the researcher's assessments. The researcher had no familiarity with the history or reputation of the agencies, the individuals involved with the proposals, or the political forces within the state. The researcher had not worked for the agencies of state government that prepared or reviewed the proposals, nor was the researcher predisposed to any expectations or observations about the APDs.

The proposals were evaluated on overall presentation quality in fully addressing all six IRM aspects, presentation quality (e.g., proofreading, writing quality, organization, supporting data), funding outcomes (IPO records of recommendations and actual legislative/governor's allocations), components cited (e.g., strategy, external mandates, soft costs/benefits, information sharing, risks), and proposal argument justification/positioning. The researcher acknowledged the limitation that the proposal document was the primary public evidence of the project, without the supporting research and documentation that were part of building the proposal. The proposal evaluation instrument can be found in Appendix A.

The second part of the research project included interviewing the key proposal preparers, evaluators, and decision makers in the state for their backgrounds and opinions about the proposals. The inclusion of their opinions was based on King and Kraemer's (1986) theory that one must understand the ideas and needs of the decision makers in order to construct effective investment arguments. The demographic data collected addressed the individual's role in the process, experience in state government, educational level, IT education sources, and experience with IT proposals. These aspects were based on the differences between end users' and IT professionals' perceptions cited

by Bariff and Lusk (1977), Ketler, Smith, and Weinroth (1992), Kiel (1997), Lewis (1990), Rocheleau (1992), and Weldon (1995).

The interview format was designed to elicit opinions about the usefulness of IPO IRM critical success factors, as well as the measures of publicness as cited by Bozeman and Bretschneider (1986, pp. 478-481). The measures included (a) strategic positioning of project to fulfill mission, (b) low tolerance for risk, (c) insufficient cost measurements and verification means, and (d) lack of tangible rewards/punishments for performance. The interviewees were asked for their opinions about persuasive and effective presentations of IT proposals, and the influence of factors outside of the proposals based on the findings of Newcomer and Caudle (1991) and Parker (1995). The open-ended questions provided opportunities for the respondents to contribute additional points of information and observations about the proposal format and review process. The interviewer had opportunities to pose additional questions during the interviews. The researcher pilot-tested the interview format with 3 participants and then made minor wording changes to the questions for clarification based on the feedback received. The interview format was reviewed by the two external reviewers and the dissertation committee for validity of addressing the salient points of the study. The sample size was too small to create duplicate questions for testing internal reliability, as well as risking insulting the interviewees by asking questions more than once. The final interview questions are presented in Appendix B.

Assessment Techniques

The proposal documents were examined for content and presentation of the proposals, and the results were coded using Likert, ordinal, and nominal scales. The interview results were coded onto the survey forms. The results of the data analysis were

evaluated using computer-based statistical software to determine correlation relationships and data categories. Categorical statistical analysis was conducted and nonparametric statistical measurements such as cross tabs and chi square statistics were generated. Some of the data sets cells were empty, making chi square analysis invalid, so categories were compressed to generate sufficient cell value sizes. The proposal data were stratified by funding year and the interviewees were grouped by individual role in the proposal funding process: (a) agency proposal generator, (b) IPO reviewer, or (c) legislative funder. Comments from open ended interview questions were incorporated into the analysis of the results.

Procedures

In preparation for the research study, preliminary discussions were held with IPO and Office of Technology managers and staff members, a fiscal analyst for the House, and a financial analyst from the governor's staff, to generate ideas for questions and assessment of the proposals. Their insights, as well as recommendations about proposal components and effectiveness from the literature, were combined to create the evaluation instrument.

The analysis of the data in the IT proposals was based on the documents themselves and the IPO record of the actual funding granted, excluding verbal or other nonwritten data related to the proposals and evaluations. The researcher conducted the examination of each proposal document over a period of 6 weeks and assigned the category codes. The proposals were evaluated in a random sequence, to reduce alphabetic organization, funding cycle year, or halo effect biases.

The researcher invited the individuals involved with the preparation and review of the proposals to participate in the interviews. After the researcher received

acknowledgment of willingness to participate, copies of the questionnaire were sent ahead of the meeting time to allow time for review and thought. Personal interview meetings were set up, and fax or e-mail was used if personal interviews were not feasible. Not all the individuals were available, but 25 agreed to participate. A majority of the interviews were conducted via face-to-face interaction, due to the number of open-ended questions. The researcher attempted to introduce as little bias as possible in the interview sessions through facial expressions and body language. Respondents were promised anonymity and were not identified by name in this paper, only by role in the proposal preparation and review process. Also a summary of the findings of the dissertation was sent to all interviewees.

Summary

Although the State of Minnesota had used a common format for major IT funding proposals, no evaluation of the effectiveness of the proposals in garnering funding had been conducted. The opinions of the key stakeholders regarding the process and proposal format had not been evaluated either. A study of the stakeholders' perceptions of the proposal format and funding process effectiveness can provide guidance for the redesign of the proposal format/process to retain its strengths and replace/redesign its least effective parts. Knowing the proposal aspects that are strongly related to successfully receiving funding can provide guidance on the topics to include in future proposals. Determining the preferences and perceptions of the reviewers for proposal information and presentation can assist agencies in creating compelling cases for IT investment.

Chapter 4

Analysis of the Data

Introduction

The data results for the nine research questions are presented in this chapter. The final number of interviews was 25, and 51 proposals were analyzed. The resulting data were analyzed for nonparametric statistical relationships using chi-square tests of independence. These tests are used to estimate the population variance from the sample variance, by comparing the expected frequencies of categories to the observed frequencies (Black, 1996, p. 333). Relevant statements from the interviewees were cited in the appropriate research question answers. The critical alpha level for the statistical tests used was .05 (which means the likelihood of the result happening by accident is more than 5 in 100).

Research Results

The following section is organized by the research questions with the results of the data analysis supporting each question. The first research question identified the different levels of funding given to proposals compared to the requested funding, and the relationship of the quality of the proposal's presentation format to the funding level received. Parker (1995) noted that poorly presented written presentations were less effective in successfully obtaining funding because they demonstrated a lack of competence on the part of the preparers. This theory was confirmed by 96% of the respondents in this sample, who stated that the quality of the written proposal was critical to being fully funded. Of those responses, the majority (60%) thought it was somewhat important. Those who ranked it higher were mostly IPO reviewers who have had the experiential benefit of seeing many agency proposals over several previous funding

cycles. However, 57% of the interviewees thought that the influence and reputation of the agency was more important than the written proposal document in successfully obtaining funding, and none thought the proposal document was less important than the agency's reputation.

Of the 51 proposals in the two funding cycles, there were 29 (57%) in the 1994-1995 legislative funding cycle, and 22 (43%) in the 1996-1997 funding cycle. Of the proposals that received funding in 1994-1995, the IPO reviewers recommended 20 for 100% or more of what was requested and three for less than 100% of what was requested. In this same group, the legislature/governor allocated 13 proposals 100% or more of requested funding and 10 for less than 100% of request. In the proposals that were funded for 1996-1997, the IPO reviewers recommended 14 for 100% or more of the request and three for less than 100% of the request. The legislature/governor granted 100% or more funding requested to only five of the proposals, and less than 100% funding to 12 proposals. The differences may have resulted from a variety of undocumented perceptual and political reasons, and the size of the total pool of available funds.

The credibility and value of the IPO review and recommendation was supported by 87% of the respondents who said it was very important to somewhat important in obtaining successful legislative funding. The agency CIOs did not give the IPO recommendation as much credence as did the rest of the respondents. Some of the agency CIOs stated that they viewed the IPO review as a roadblock in the proposal process (usually when poorly prepared documents are returned or given low scores), instead of seeing the IPO as a partner with the agency staff in creating successfully funded proposals.

The researcher ranked the proposal editing and presentation of each section on a Likert scale. The completeness and crafting of each section's presentation quality by proposal section was also ranked. The results are shown in Table 1. The evaluations of the presentation quality of the proposal sections were almost evenly divided between those extremely well-prepared to well-prepared (50.9%), and those that were adequately or less well-prepared (49.1%).

Table 1

Researcher's Evaluation of Agency Proposal Sections by Completeness and Crafting

Proposal section	Percentage of proposals that were 60% or more complete	Percentage of proposals that were rated 60% or better in crafting and presentation quality
1	53%	49%
2	54%	51%
3	54%	49%
4	54%	53%
5	52%	53%
6	56%	49%

Overall, the proposals were not substantially differentiated in quality and completeness in the evaluation of the researcher. Only minor differences were observed in the quality of the proposals on file. The worst of the proposal drafts were sent back to the agencies by the IPO reviewers before ever being submitted to the full IPO review process, so they were not in the group of proposals archived by the IPO and analyzed by the researcher. There were no records available on the poor quality initial drafts

submitted by the agencies to the IPO that were rejected. Sometimes the agencies revised the proposals to resubmit them, and other times they withdrew the proposals completely to do more research or reframe the proposals before resubmitting them for a future funding cycle.

To determine the relationship of the researcher's evaluation of proposal quality to the likelihood of the proposal receiving a full funding recommendation from the IPO, the proportions between overall appearance evaluation and level of IPO recommended funding were analyzed. Table 2 shows the categorical results of the IPO funding recommendation in relationship to the overall proposal quality assessment of the researcher. The researcher rated the proposals for their overall appearance based on visual inspection and compliance with IPO recommended content. The contingency table columns were collapsed and cells combined in order to ensure that each cell had at least five items in it, so that the use of the chi-square test of independence was meaningful. The majority of the proposals (85%) received recommendations of 100% or more of requested funding after review and of that 85%, 15% received recommendations for more than 100% of requested funding.

After the IPO had reviewed the proposals, 15% were recommended for less than 100% of requested funding due to their poor preparation. The IPO considered other undocumented factors about the agency and project, in addition to the proposal document. Seventy percent of the proposals were recommended for full funding, and 15% were recommended for more than what had been requested by the agency, for a total of 85%. The IPO interviewees said that they thought the latter category of agencies had underestimated the costs of the project, so the IPO added the funds necessary to get the

project done properly. The eventual funding level of the proposals reflected the confidence the legislator and governor had in the IPO reviewers' assessments of the APDs.

Table 2

IPO Funding Recommendation in Relation to Overall Proposal Appearance Assessment

Proposal overall appearance category as evaluated by researcher	Percentage of proposals that were recommended by the IPO reviewers for funding of 100% or more of requested funding	Percentage of proposals that were recommended for less than 100% of requested funding by the IPO reviewers
Extremely Good	29%	0%
Very Good	25%	20%
Well-prepared	11%	20%
Adequately Done	25%	40%
Poorly Done	10%	20%

Note. The percentages shown are by column.

Table 3 displays the detail of the IPO funding recommendation by percentage group categories of funding recommendations compared to the researcher's assessment of overall appearance. The extremely well-prepared proposals were much more likely to receive a recommendation of 100% (or more) of requested funding by the IPO reviewers (29% compared to 0%). The chi-square test was not an appropriate test of independence for this data set because several of the individual cell values were less than 5. The extremely well-prepared proposals may have been perceived as demonstrating the agency's ability to excel at researching and preparing for a project, thus inducing the IPO reviewers to assume the same skills would also be applied to successfully implementing

the project after funding was received. The rest of the APDs with lower quality level assessments of appearance had a more pronounced difference in the likelihood of receiving the funding level requested.

Table 3

IPO Funding Recommendation in Relation to the Researcher's Overall Proposal Content Assessment

Overall content assessment by researcher	Column % of proposals	100% or more requested funding	99-70% funding	69-40% funding	39-20% funding	19-0% funding
Extremely well-prepared	22%	40%	26%	0	0	0
Very well-prepared	21%	40%	22%	0	0	50%
Well-prepared	19%	20%	9%	50%	0	0
Adequately done	26%	0	30%	50%	100%	0
Poorly done	12%	0	13%	0	0	50%

Table 4 shows the relationship between the amount of funding (less than 100% and 100% or greater) eventually received from the legislators and governor, and the researcher's evaluation of the overall quality of the proposal. The governor and legislators funded 18 of the 40 projects at 100% or more than originally amount requested. If IPO reviewers thought that the funds needed for successful completion of the project were underestimated, additional funds were recommended and often funded by the legislators and governor. The drop-off rate (51 to 40) in the number of projects submitted to those actually funded was a result of a variety of situations. The reasons included

(a) political pressures making some proposals unfavorable; (b) the governor's priorities, causing him to veto projects; and (c) a poor agency (or CIO) reputation for successful completion of projects.

Table 4

Percentage of Proposals Receiving Legislators' Funding and the Overall Proposal Appearance

Overall proposal appearance as evaluated by researcher	Percentage of proposals awarded 100% or more of request by the legislature/governor	Percentage of proposals recommended for less than 100% of requested funding by the legislature/governor
Extremely well-prepared	29%	12%
Very well-prepared	35%	12%
Well-prepared	18%	12%
Adequately done	12%	41%
Poorly done	6%	23%

It is interesting to note that even some of the adequately and poorly done proposals received 100% or more of requested funding and some extremely well-prepared proposals received less than 100% of the requested funding. This indicates that factors other than the quality of the preparation and the appearance were important influences in receiving funding from the legislature and the governor. Political agenda and agency reputation were not measured, but they may be the strongest decision-making motivators for legislators and the governor. The striking difference between these results and those for the IPO reviewers (Table 5) suggests that the IPO reviewers were evaluating only the document with few political agenda biases.

Contingency tables were prepared to examine the relationships between the completeness of the proposal content areas and the IPO funding recommendations (see Appendix C). Some of the cells in the contingency tables had a value of zero, which renders the chi-square statistic unreliable. Table 5 shows the chi-square statistical results and significance for each proposal section (evaluated at 80 to 100% complete) to the IPO funding recommendation. None of the chi-square statistical results was significant at the .05 alpha level. There were no statistically significant relationships between the completeness of the proposal sections and the IPO funding recommendation, indicating that the evaluators looked at the APD as a whole and knew the agency's capabilities by means beyond the written proposal documents.

Table 5

Chi-square Tests Examining the Relationship Between IPO Funding Recommendation and Proposal Section Content Completeness

Responses	Chi-square	Significance Level
Word processed and edited	0.81	0.369
Section 1 100-80% complete	1.88	0.17
Section 2 100-80% complete	1.88	0.17
Section 3 100-80% complete	1.30	0.254
Section 4 100-80% complete	1.58	0.209
Section 5 100-80% complete	1.30	0.254
Section 6 100-80% complete	1.58	0.209

Contingency tables (2 by 2 tables) were also prepared to evaluate the relationships between the researcher's evaluation of the crafting and presentation of the sections of the proposals and the funding recommendations by the IPO (see Appendix D). Table 6 shows the chi-square statistics and likelihood of the independence of each relationship, although some of the contingency table cells had a value of zero rendering the chi-square calculation unreliable. No statistically significant relationships at the .05 alpha level resulted when the crafting and presentation appearance of the sections were compared to the IPO funding recommendation level.

Table 6

Chi-square Tests Examining the Relationship Between the IPO Funding Recommendation and the Quality of Crafting and Presentation

Quality of 100-80% complete, well-crafted, and presented	Chi Square	Significance Level
Section 1	1.30	0.254
Section 2	1.30	0.254
Section 3	0.38	0.54
Section 4	1.05	0.306
Section 5	0.81	0.367
Section 6	1.30	0.254

The crafting, completeness, and appearance of the individual sections did not have a positive correlation to the IPO reviewers' funding level determination. This finding was in contrast to Table 5, which showed the overall proposal quality assessment was positively correlated to a higher IPO funding recommendation. Often the IPO reviewer

had worked closely with the agency in the development of the proposal and was aware of the background of the IT project, as well as the IT skills of the agency overall. The IPO reviewers' funding recommendation did not appear to be influenced by use of color charts, multidimensional graphs, or special binding in the proposal documents. The IPO reviewers had substantial IT background and training (see Table 15), and their knowledge of the agency's staff knowledge and abilities may have influenced the IPO reviewers' assessment of the worthiness of the proposals more than the written proposal.

Similar contingency tables were prepared by the researcher to examine the relationships between the section completeness of the proposal content as evaluated by the researcher and the level of legislative funding given to the proposals (see Appendix E). Table 7 displays the chi-square statistics and probability of the results occurring by chance, compared for each proposal section and level of legislative funding. The relationship of the overall assessment of the six sections in each proposal was evaluated against the legislative funding received as a percentage of original request. The relationship was significant at the .05 level, indicating that the appearance had a significant influence on the successful outcome of receiving funding from legislators.

Table 7

Relationship Between Legislative Funding Level and Proposal Appearance

Evaluation of proposal sections by researcher	Chi Square	Significance Level
Proposal section 1	6.13	0.013*
Proposal section 2	4.62	0.032*
Proposal section 3	4.85	0.028*
Proposal section 4	4.62	0.032*
Proposal section 5	6.38	0.012*
Proposal section 6	8.09	0.004*

Note. * indicates significance at the .05 alpha level or lower.

Table 8 displays the chi-square statistics between the level of legislative funding in relation to the request and the proposal section presentation quality (as evaluated by the researcher) between 80% and 100%. All the results were significant above the .05 alpha level, indicating the influence of a well-prepared presentation on receiving full legislative funding. The perception of the written document as representative of the competence of the agency's ability to successfully execute the project was demonstrated in the receipt of successful legislative funding allocation for well-prepared proposals. The legislators and their staff members do not work with the agencies on a frequent basis, and the proposal document is often the sole means of making a positive impression for the agency.

Table 8

Chi Square Tests Examining the Relationship Between Legislative Funding Levels and Proposal Crafting and Presentation

Proposal section crafting and presentation at 80-100% level	Chi Square	Significance Level
Overall crafting and presentation quality	4.29	0.038*
Section 1	10.49	0.001*
Section 2	8.62	0.003*
Section 3	4.78	0.029*
Section 4	8.62	0.003*
Section 5	6.89	0.009*
Section 6	10.49	0.001*

Note. * indicates significance at .05 level or less.

All of the chi-square scores for the proposal sections and funding relationships were statistically significant in the relative likelihood of very well-prepared proposal sections receiving funding from the legislators and governor. This is in contrast to the lack of statistically significant relationship between these factors and funding recommendation levels from the IPO reviewers as shown in Table 6. The proposal clearly serves as a sales document that influences the legislators' perception of the ability of the agency to successfully execute the project. Legislators want to support projects that will be successful, so a good quality proposal indicates the project is worthy of funding.

The second research question investigated the relationship between the proposals with soft costs and benefits cited and the percentage of funding received. Newcomer and Caudle (1991, p. 377) and Chung-Yuang (1989) cited the importance of providing

proposal evidence balanced between hard and soft data. Public service motivations include serving the public interest, which is a soft benefit (Perry & Wise, 1990). Quantification of acquisition costs is easier with discrete parts of the proposals such as hardware, software development, and consulting costs, but estimates of many types of benefits are harder to provide because so many are intangible. Soft benefits may include (a) better reports, (b) building a base for future information projects, (c) improved interchange and sharing of data, (d) easier training, or (e) improved data accessibility. The difficulty in consistently identifying project value and failure is often rooted in the variability of individual perceptions.

In response to the question about personal comfort with the soft costs/benefits estimates, the interviewees' responses were split between somewhat comfortable (52%) and not comfortable at all (48%), with no one being comfortable. This split of opinions is an indicator of the lack of a consistently used or understood model for estimating the soft costs and benefits of any IT project in the state environment. The somewhat comfortable degree of trust by 52% of the respondents was not warranted by consistent use of a uniform statewide methodology for estimation, and only one of the proposals actually cited how the estimates were created. Over half (59%) of the proposals cited soft costs/benefits in the rationale for investment, while 90% of the proposals cited the hard costs/benefits. The presence (or absence) of an estimation quantification method did not have an impact on the success of funding, as 38 proposals without an estimation method cited received funding, too. The types of soft benefits that were cited in the proposals included (a) increased information sharing and contribution to the state's infrastructure (65%), (b) benefits to taxpayers and businesses (62%), (c) support of research (43%), and

(d) second order benefits to the organization and people (8%). More than one type of soft cost and benefit may have been cited in each proposal.

Table 9 displays the chi-square relationships of the citation of specific soft benefits in the proposals to the IPO recommended funding of 100% or more. The contingency table is displayed in Appendix F. The researcher noted whether there was any mention of a type of soft benefit in the proposal document. There were no statistically significant relationships between the levels of IPO funding and the citation of soft benefits in the written proposal. The value of the soft benefits was not clearly reflected in the relationship to the level of funding received.

Table 9

IPO Funding Recommendations of 100% or More and Citation of Soft Benefits in the Proposals

Soft benefits cited in proposals	Chi Square	Significance Level
Research	0.03	.859
IT and end user benefits	2.15	.143
Quantified costs/benefits	0.94	.331
Benefits to citizens	1.99	.158
Second order effects	0.01	.933
Information sharing	0.46	.499

Table 10 shows the chi-square statistical relationships between the legislative funding levels of 100% or more and the types of soft costs and benefits specifically cited in the proposal.

Table 10

Legislative Funding of 100% or More and Citation of Soft Costs/Benefits in Proposals

Type of Soft Costs and Benefits Cited	Chi Square	Significance Level
Research	0.07	.798
IT and end user benefit	0.24	.622
Citizen benefits	1.16	.281
Second order effects	1.93	.165
Information sharing	1.07	.302

There were no statistically significant relationships between the degree of legislative funding of proposals and the types of soft costs/benefits cited in the written proposals. This finding was congruent with the results for the IPO reviewers, and it is indicative of the parties' perceived lack of significance for soft costs/benefits in decision making. Other factors in the proposals, such as the agency's reputation from past projects or the verbal advocacy between the agency CIO and the funders, may have been more important in influencing eventual funding.

The third research question examined the importance of project positioning (as mandated by an external authority or strategic need) to receiving funding. The integrated nature of organizational planning to improve the effectiveness of communications, operations, and planning dictates the establishment of building blocks of IT systems. This often forces the investment argument positioning to move a higher level than just financial measures. The three most important factors for IT proposals cited by the interviewees were (a) executive leadership/involvement, (b) reputation of agency and staff, and (c) accurate/justified estimates of costs and benefits. The top two factors are

perceptual in nature (difficult to measure and document) and consistent with a highly political organization. Without a commonly accepted and utilized estimation model for used by all state agencies for soft costs/benefits, it is unlikely that the funders' confidence levels will ever be similar.

Fewer than half of the interviewees (44%) cited the strategic fit of the project with the state's goals as important. This finding is indicative of the proposals being evaluated as disparate, unrelated entities instead of being related within a larger context of the state's IT goals to create synergistic benefits between related project investments. The current state funding process allocates agency requests to different House and Senate committees, which eliminates the ability to present an integrated perspective of all IT investments. Funding can only be allocated to one agency, even for cooperative multi-agency projects. Each agency competes against the others for a relatively small pool of available funds, but the requests are not evaluated within a larger context of the state's goals.

Of the projects cited as being strategic in purpose, all of them received the requested funding recommendation or more from the IPO reviewers who understood the importance of a statewide and agency strategy context. The projects that were part of a larger, longer-term strategic effort for the agency were all recommended for funding at 100% or greater of the request by the IPO reviewers. Only 20.6% of the APDs without strategic impact were recommended for funding at 100% or above by the IPO reviewers. Proposals without long-term strategic reasons for the project had less than a 1 in a 100 chance of receiving an IPO funding recommendation for less than 100% of the request. While the legislative funding recommendations for proposals with and without strategy

cited were not as dramatically differentiated, more proposals with strategy cited received 100% or greater of the funding request than those not citing strategy. This result indicates the value of citing strategic purpose in the proposal document.

The project justification argument of a strategic effort for the agency was cited in 71% of the proposals. Support of the state's larger goals was cited by 53% of the proposals. The rationales for the 51 projects fell into the following major justification categories (some projects fit more than one category): (a) increased information sharing/contribute to infrastructure (75%), (b) part of a strategic effort (71%), (c) supporting research (43%), and (d) mandatory compliance with regulation (27%).

Table 11 shows the relationship between funding levels and presence of justification arguments in the proposal. The first column displays the type of argument and the accompanying row shows the percentage of the proposals that included the argument by type and level of funding. The researcher noted the comments in each proposal that related to investment justification arguments including (a) support of agency strategy, (b) compliance with mandatory regulations, (c) support of research, and (d) enabling increased levels of information sharing across agencies within the state.

Table 11

Relationship between IPO and Legislative Funding Levels and Presence of Proposal Justification Arguments

Investment justification present in proposal	IPO funding recommendation 100% or more	IPO funding recommendation less than 100%	Legislative funding 100% or more	Legislative funding less than 100%
Agency Strategy	80%	0%	78%	59%
State Strategy	62%	17%	67%	41%
Compliance with Mandatory Regulations	32%	17%	44%	18%
Research	47%	33%	50%	41%
Increased Information Sharing	74%	50%	84%	64%

Note. Total of 51 proposals.

The IPO reviewers decidedly look for agency and state strategy citations in the proposal documents, as evidenced by the lower funding recommendations made for those proposals without strategy citations. In all the categories for IPO and legislative recommendations, those proposals citing some type of proposal justification received higher levels of funding. This result indicates that the inclusion of a proposal justification improves the overall funding recommendation.

Table 12 shows the relationship of a mention of state or agency level of strategy in the proposal document compared to the level of funding recommended for the proposal by the IPO and the legislature and governor. There were no significant relationships for the legislative funding decisions, but there were for the IPO recommendations.

Table 12

Citation of Agency and/or State Strategy in Proposals and the Funding Levels in Relation to Funding Recommendation from IPO and Legislators

Type of strategy citation	Presence of strategy in the proposal document	IPO 100% funding or more	IPO less than 100% funding	Legislative 100% funding or more	Legislative less than 100% funding
Agency Strategy	Yes (71%)	79%	0%	78%	59%
	No (29%)	21%**	100%**	23%	41%
State Strategy	Yes (53%)	62%*	17%*	67%	41%
	No (47%)	38%*	84%*	33%	59%

Note. * indicates significance between columns of .05. ** indicates a significance between columns of .01.

Only 79% of the proposals citing agency strategy and 62% of the proposals citing state strategy received an IPO funding recommendation of less than 100%. Full funding IPO recommendations may be related to a perceived lack of agency planning or executive IT leadership skills. All the proposals without agency strategy cited received an IPO recommendation of less than 100%, but 40.9% of them received less than full funding from the legislature. There was not a statistically significant relationship between citation of a fit with a larger strategy and successful allocation of funding, suggesting that other factors were more important for the legislative decision-making process. These other factors may include quality of proposal presentation or reputation of the agency based on previous projects. The IPO reviewers understand the importance of strategy and contextual placement in the effective use of information systems and technology, but the legislators view each proposal individually without a strategy context (due to the state's requirement of agency specific proposal funding).

The fourth research question evaluated the percentage of funding levels requested and received by proposals citing risk assessments and those that did not cite risks. A frequently employed strategy by those creating the funding proposals is to present as positive a spin as possible and not mention the possible risks. However, the funding decision makers ask hard questions about risk of failure and mitigation plans for addressing the risks. The inclusion of different types of risks in proposals is critical to presenting a complete picture. Avoidance of risk is one of the highest concerns for public servants, indicating that risks should be addressed explicitly, to reassure the decision makers that the project has been well-considered and plans have been made to contain the manageable risk.

Table 13 shows the relationship of the number of proposals receiving either full or greater funding recommendations from the IPO reviewers or less than requested funding, compared to the citation (or absence) of risks in the body of the proposal. Of the proposals receiving less than 100% funding recommendations, 83.3% did not cite risks. Of the proposals receiving 100% or more funding recommendations, proposals with and without cited risks were almost evenly split. Citing risks did not guarantee a full funding recommendation, but not citing them increased the likelihood of not receiving a full funding recommendation from the IPO reviewers.

Table 13

IPO Funding Recommendations Compared to the Citation of Risks

Risks Cited	Number	100% funding or more recommendation	Less than 100% funding recommendation
Yes	17	44.1%	16.7%
No	34	55.9%	83.3%

Table 14 displays the ratio of proposals receiving all or more funds than requested from the legislature compared to those receiving less than the requested funds contrasting proposals citing risks and those that did not. More than 68% of the proposals without risks cited received less than 100% of the requested funding from the format, similar to the proportion of the proposals without any risks cited at all.

Congruent with the IPO reviewers' funding recommendations, proposals that did not cite risk were more likely to not receive full legislative/governor funding recommendations (68%). There was no statistically significant relationship between the funding that proposals received that cited risk or did not cite risk. The chi square for the IPO recommendations was .66, and the significance level was .416. For the legislative funding recommendations, the chi-square was .02, and the significance level was .894. Risk is only one of the many factors influencing the perception of the surety of the proposal's estimates and future success, and the recommended funding. Legislators have self described long memories about agency CIO and staff members' performance and delivery of projects and agencies that have failed in the past, and may have exaggerated perception of risk.

Table 14

Legislative/Governor Funding Level Recommendations and Citation of Risk in the Proposals

Risks Cited?	n	100% funding or more of requested funding received	Less than 100% of requested funding received
Yes	17	39%	32%
No	34	61%	68%

The fifth research question sought the demographic differences between the groups of respondents (preparers, evaluators, and legislative). Perceptual differences and information asymmetries occur between IT professionals and end users, based on individual training and priorities. Successful funding requests need to integrate the multiplicity of expectations from end users, senior management, and IT professionals in structuring any proposal. Table 15 shows the demographic differences between (a) the proposal preparers, (b) the proposal reviewers in the IPO, and (c) the legislators/staff members.

The legislators and their staff members had the least government and IT experience (which is understandable, since they were not elected or hired specifically for those skills). Legislators frequently have had different nongovernmental careers outside of the legislature (e.g., lawyer, farmer, logger, professor). Eighty-four percent of the legislators on key IT funding committees and staff (who were interviewed) had more than 6 years of experience with IT issues.

A comparison of educational backgrounds shows that all but one of the interviewees had a bachelor's degree, and 58% had post-baccalaureate degrees and

education. Three of the respondents had an IT-related bachelor's or master's degree. The absence of college training in computer-related courses for the agency APD preparers indicates that they grew into their current positions through on-the-job-training. Only two IPO reviewers in the sample had some university-level MIS education, and on-the-job-training was common for all respondents. The legislators had the most post baccalaureate education, with law degrees and a doctorate, but the least experience with evaluation of proposals.

On-the-job training was the preponderant source of technical knowledge (96% for the entire group), but vendor training was also a frequent source of IT knowledge for the agency staff and IPO reviewers (56%). Nonacademic training by vendors is limited in the degree of theory presented, as well as by having vendors' biases built into the information presented. State and agency status quo practices and current technology limitations also created biases for the decision makers. The legislative decision makers' preponderance of career experience in primarily governmental settings implies a narrower perspective of IT usage and investment justification strategies.

Table 15

Demographic Characteristics of Proposal Preparers, Reviewers, and Funders

Characteristic	Preparers (n=3)	IPO Reviewers (n=8)	Legislators/Staff (n=8)
Years in Government	All more than 10 years	6-10 years=13% > 10 years=63%	6-10 years=13% > 10 years=50%
High School/ Bachelor Degree	33%/33%	63%	25%
Post Bachelor Studies	33%	37%	76%
>10 Years IT Experience	67%	100%	38%
Experience with IT Proposals	100%	100%	51%
Source of IT/computer education:			
On-the-job Training	100%	100%	88%
Vendor Training	100%	63%	13%
College Training	0	25%	0

Note. A single person may be counted in more than one of the preceding three categories of IT/computer training sources. Six missing cases are due to nonpersonally interviewed respondents not answering the questions.

The sixth research question investigated the degree of congruence of interviewee opinions when asked to rank the most and least important proposal factors. Traditional critical success factors (CSFs) from the literature and practice have been questioned for relevance, and some of the widely used accounting-based measures have also been criticized soundly by researchers. Cognitive styles and implementation apprehension have been cited as two major factors in differentiating user perceptions about IT investment (Parker, 1995). Newer CSFs for successful investment proposals include support of explicit business objectives and response to competitive pressures. Linkages in the proposals between content, context, and process appeal to different decision makers.

Table 16 illustrates the results of the interviewees' perceptions of the least important factors in the proposals. Each person was asked to rank the three least important factors in the proposals. Many of these lowest ranked proposal factors were considered soft issues (e.g., hard to consistently and accurately quantify) in the proposals. Evaluators considered the soft problems, such as organizational structure or having an effective IT skills base, as problems for the agencies to resolve internally. Whether or not soft factors are important to funding decision makers was not clearly demonstrated in the resulting data. Another deterrent to citing soft factors was the lack of a standardized estimation model throughout the State of Minnesota. The estimates provided in the proposals are subjective, as is their credibility. Although soft benefits are often the primary reason for investing in IT, the value of their inclusion in a cost and benefit case is very much in the eye of the beholder.

The results in Table 16 demonstrated the wide variance of the respondents' perceptions of the relative importance of the various proposal factors. Each interviewee was asked to rank his/her perception of the importance of each factor on the list. The highest amount of agreement on the lack of value of citing second order benefits was only 56%. Second order effects of changes in work content and relationships within the agencies were not perceived as important to the value of the investment; however, the user satisfaction may be dependent on the second order effects. The reputation of the agency and risk of failure were only cited as least important by two of the respondents. This supports the statements made by many of the interviewees about the funding more likely being given to agencies with good track records of successfully completing projects within time and budget estimates. Having the specific risks of failure ranked as

the second lowest of the least important factors supports this, too. With funders wanting assurance of low risk projects from agencies with excellent reputations, a conundrum is created for an agency with no history of successful project execution or for one trying to dispel a record of poor performance.

Despite multiple training sessions sponsored by the IPO when the IRM infrastructure platform for the state was introduced, most respondents claimed to have no idea of what role an effective skills base (within the agency) or an agency's IRM infrastructure had to do with successful project execution. The IPO evaluators were very familiar with the sound reasons for having the IRM factors in place in the agencies, but they were clearly in the minority of the interviewees. The legislature had endorsed the IRM platform for use by all state agencies in IT, but the agency CIOs and legislators did not fully internalize or understand its implications and usage. The disparity of interviewee perceptions of the least important factors of the proposals is another indicator of the need for training for all parties involved in the proposal process to create common expectations. The relative perceived merit of each factor may be a function of an individual's position in the process and the government, or degree of cynicism and experience in the government system.

Table 16

Least Important Factors in Written Proposals as Cited by Respondents

Factors in proposal content	n	%
Second Order Effects	14	56
Degree of Flexibility	11	44
High Level Resource Plan	10	40
Organizational Structure	7	28
Justification of Assumptions	5	20
Strategic Fit	5	20
Accurate Estimates	4	16
Effective Skills Base	3	12
IRM Infrastructure	3	12
Risks of Success	2	8
Reputation of Agency	2	8

Note. The rest of the categories had 0 responses.

Table 17 displays the results of the interviewees' rankings of most important factors in the proposals. In Table 17, the three lowest ranked factors of the most important proposal factors were (a) high level resource models, (b) degree of flexibility in the project plan, and (c) identification of second order effects on the agency. Some respondents stated that these soft items made no sense to them so they could not judge them. The high level resource plans were part of the original IRM concept advocated by the IPO and added as a proposal requirement, but these plans are infrequently developed by the agencies, due to lack of understanding of IRM value and execution skills. The

legislators and their staff are not fully trained or highly skilled in IRM implementation details. Respondents stated that it was up to the agencies to manage the second order effects on job processes and functional area interactions, and that citation of those effects was not needed in the proposal.

Table 17

Most Important Factors in Written Proposals Cited as by Respondents

Proposal Factors	n	%
Executive Leadership	15	60
Reputation of Agency/Staff	13	52
Accurate Estimates	12	48
Strategic Fit	11	44
IRM Infrastructure	4	16
Citation of Risks	2	8
Second Order Effects	2	8

Note. The rest of the categories had 1 or 0 responses.

The two most important factors (with over half the respondents evaluating them as one of the top three) were those that sold the proposal personally (the executive leadership of the agency) and perceptually (the reputation of the agency). These factors are very difficult to objectively measure or quantify. The third most frequently cited factor in importance (accurate estimates) relates to the confidence that the reviewers and funders have in the leadership and reputation of the agency and the agency CIOs' ability to create accurate estimates. Despite the insistence on reliable estimates, the eventual

accuracy of the outcomes against the original estimates are not consistently measured or evaluated by any state body after the project implementation, creating an ironic situation.

When asked if the reputation of the agency and IT personnel influenced the funding more than the written proposal, 14 respondents said it was more important and 8 said it was equal in importance. Only 2 said it was less important. The agency reputation was established through execution of previous projects, and respondents reported that the reputation persists for the agency, despite replacement of key agency personnel. Eighty percent of the respondents stated that a good quality written proposal was more important than the reputations of the agency and personnel, with only 8% stating it was not important. Sixty percent of the respondents stated that the quality of the writing of the proposal presentation only somewhat influenced their decisions, with 36% saying the citation of risks very much influenced the funding outcome.

Table 18 displays the rankings of the most and least important factors in the proposals. The three common factors in the overlap between both columns are (a) strategic fit, (b) IRM infrastructure, and (c) risks of failure. Considering the different biases and priorities of each group of respondents, as well as the differences in MIS education and proposal evaluation experience, the three middle items hold disputable weights in influencing funding decisions. Table 11 shows that IPO reviewers like citations of strategy, but legislators were not as swayed. Tables 13 and 14 show the relationship of presence of risk in a proposal to the likelihood of its being funded. The IPO reviewers were less likely to recommend full funding when risks were not cited, as were the legislative respondents.

In response to the question whether or not a proposal should present multiple scenarios based on different levels of funding, 13 said yes, and 12 said no, resulting in no majority opinion. Proposing only part of a project or partial alternatives was viewed by the agency CIOs as an opportunity to receive less than full funding for the project by admitting it could be done in phases. Agency proposal preparers were loath to open the possibility of having a project, sliced up by legislators through segmented funding allocations, but the legislators were interested in knowing if projects could be segmented. This gap in expectations of openness and anticipated reactions is part of the poker playing in which the agencies and the funders acknowledge they engaged during every funding cycle. A cooperative spirit among the IPO, the agencies, and the legislators based on a rational, open process with common goals was not described by any of the interviewees.

Table 18

Most and Least Important Factors in Proposals as Ranked by Interviewees

Factors in Proposals	Ranking of Most Important Factors	Ranking of Least Important Factors
Executive Leadership	1	Not ranked
Reputation of Agency/Staff	2	10
Accurate Estimates	3	6
Strategic Fit	4	5
IRM Infrastructure	5	8
Risks of Success	6	9
Second Order Effects	7	Not ranked
Degree of Flexibility	Not Ranked	1
High Level Resource Plan	Not Ranked	2
Effective Skills	Not Ranked	7
Organizational Structure	Not Ranked	3
Justification of Assumptions	Not Ranked	4

The seventh research question addressed the relative importance of the written proposal in comparison to the CIO selling the worthiness of the project. The agency CIO's advocacy and reputation was cited as a significant influence in the pretesting interviews and by other researchers. Table 19 shows the responses to the question about the importance of the agency reputation. The reputation was cited as more important by 14 of the 24 respondents (58.3%), primarily the legislators and agency personnel. Those who responded that the agency reputation was less important were the IPO evaluators

who knew that the full resources and planning efforts of the agency were necessary for successful project execution, not just the incumbent CIO. Establishing a good CIO and agency reputation in the state requires a successful project management track record, as well as a positive working relationship with legislators/staff and peers across the government.

Table 19

Importance of the Reputation of Agency/Key IT Personnel in Proposal Funding Decisions

Importance of Reputation	n	Percentage
More Important	14	58.3%
Equal in Importance	8	33.3%
Less Important	2	8.3%

Note. Total population was 25 with 1 missing case.

The respondents ranked the additional factors that should be added to the written proposals. The factors with the most support were (a) risk of failure (48%), (b) contribution to fulfillment of agency/state strategy (40%), (c) assessment of the likelihood of successful implementation (40%), and (d) testing of assumptions of the costs/benefits (36%).

In the open-ended responses from the interviewees regarding ways to improve the proposals, the expectations ranged from "just give me the bullet points" to (a) adding high level resource models, (b) better risk analysis, (c) scalability of project scope, (d) performance benchmarks for nontechnical readers, and (e) more risk assessments. The degree of detail desired was related to the individual's perspective on the expenditure, funding, or project execution. The head of the multiagency technology committee also

wanted to see more emphasis in the proposals on the potential data privacy and security aspects of the proposed information system.

One legislative staff member (with no formal training in information systems theory or current practice) proposed segregating all computer-related expenditures from all agencies into a single statewide budget in order to expedite re-use of hardware and software. His reasoning was that this would allow the legislators to see how much the state spent on computers, but he was unable to supply an answer as to how this would be useful in decision making about individual project funding. In contrast, an agency CIO with many years of IT experience thought strongly that the computer-related part of any agency initiative should be presented as part of the fundamental infrastructure of the agency and specific program. The inclusion of computer resources in basic agency infrastructure, just as chairs or filing cabinets, could be integrated into the framework of providing the services to the citizens of the state, and it is more in keeping with current MIS theory and private sector practice. The wide disparity between the interviewees' points of view provided an insight into the challenges of creating a common proposal format that would serve the needs of all the state audiences with significantly different IT training and knowledge.

In response to the open-ended question, "What role do you see the proposal playing in the eventual successful outcome of the project?" the responses were quite disparate. Respondents demonstrated an understanding that the proposal is only accurate as an estimation of what was known at the time of preparation. However, 10 respondents cited the value of the document in being a tool against which the project outcome could eventually be measured. Descriptions such as the foundation of the project, institutional

memory, and feedback mechanism were used to describe the long-term value of the proposal. However, comparison of the project's results to proposal estimates have not done in any consistent way. Only three of the interviewees showed cynicism and referred to the proposal as a sales document with the sole purpose of garnering funding, instead of being a demonstration of the agency's competence in planning and investigation of a project. The majority opinion was that the document should be used as a starting point for eventual follow-up analysis to evaluate the outcomes against the projections, and then the learning should be incorporated into an IPO knowledge repository for use in future projects.

The eighth research question addressed whether or not proposed costs and benefits were verified after the project was completed. In practice, few organizations conduct postimplementation audits due to lack of staff resources, varying perceptions of success, and lack of measurable criteria. The State of Minnesota legislative auditor's report on the Statewide Systems Project (1997) recommended that postimplementation audits should be done in a formal manner. None of the respondents knew of any formal follow-up process for comparing the outcomes of the projects against the original estimates. Audits only happen in circumstances when a project is perceived to have (a) significant cost overruns (or if alleged to be a failure by the news media), (b) missed deadlines, or (c) unrealized expectations. Successfully executed projects have not been subjected to postimplementation audits by the legislative auditors. This has created a negative stigma for the audit staff.

Table 20 shows the responses to the question of degree of comfort with soft cost and benefit estimation. None of the respondents were comfortable with the estimates, and

52% were only somewhat comfortable with the estimates. Forty-eight percent were not comfortable with the estimates. Ten of the respondents cited the need for follow-up project evaluations, and one person cited the need to learn from the mistakes of the past proposals. In formal systems development life cycle (SDLC) methodologies, a final step of postimplementation audits has been prescribed for over 30 years. None of the interviewees mentioned the opportunity to learn from successful projects and create a common knowledge repository for the state, until asked by the researcher. This oversight may be due to scarce audit resources or a lack of training on SDLC theory. The respondents may also be reluctant to have their own estimates examined or to have their perceptions challenged through an impartial audit process.

Table 20

Comfort Level with Soft Cost/Benefit Estimation

Comfort level	n	Percentage
Very comfortable	0	0
Somewhat comfortable	13	52%
Not comfortable at all	12	48%

The ninth research question asked what incentives and disincentives existed for those who produced excellent proposal documents. The interviewees were asked what types of rewards and punishments were in place in the state's processes. Because the public sector does not provide outcome/performance rewards and uses intrinsic rewards as motivators, the same situation was expected for the State of Minnesota. Table 21 shows the type of perceived rewards for agencies preparing successfully funded

proposals. No monetary rewards are directly given to individuals in bonuses (per State of Minnesota personnel policies), but successfully obtaining funding for IT proposals may eventually be factored into the employee's annual performance evaluation by the employee's manager. The strongest perceived result of creating well-prepared APDs was an enhanced reputation for the agency in the form of budget allocations for the project and future projects. The most interesting result of the question was that everyone in the sample thought that there would be some type of reward for the preparer, regardless of form.

Table 21

Rewards for Proposal Preparers for Successfully Funded Proposals

Reward Type	n	Percentage
Enhanced reputation of agency and individual	13	52%
Financial in the form of successful funding allocation	11	44%
Nothing tangible	7	28%
Increased individual career promotion possibilities	5	20%
No rewards at all	0	0%

Note. Respondents marked more than one category.

Table 22 illustrates the perceived punishments for the agency or preparer of the proposal for doing a poor job on the written proposal. Lack of funding allocation (52%) and degraded reputation of the agency and the individual (40%) were the most frequently cited punishment, followed closely by nothing tangible at 28%. Interestingly, only 12% thought that decreased individual career promotion possibilities were likely. With the career longevity of many of the respondents in the state government, the endurance of a

poor reputation for an individual (despite job changes) must have been observed frequently enough to warrant the perception. Those who thought that there were no tangible punishments may have thought that failed funding requests could be due to many reasons outside of the control of the agency making it difficult to blame a single incident, person, or factor.

Table 22

Perceived Punishments for Agency/Preparer for Poorly Written Proposals

Punishment	Number of Times Cited	Percentage
Financial (lack of funding)	13	52%
Degraded reputation	10	40%
Nothing tangible	7	28%
Decreased career promotion	3	12%
None	1	4%

Note. Respondents cited more than one punishment in their response.

Summary

The analysis results demonstrated the importance of a well-prepared and presented proposal document in successfully obtaining legislative funding, and the long-term benefits for the reputations of the agencies and preparers when the proposal was not well-prepared. Soft costs and benefits are not universally understood or valued in proposals; however, the value of ensuring that a proposal fits within a strategic plan context to receive funding was demonstrated. The critical parties in the funding process had a disparity of opinion over risks that should be included in the proposals. Citation of possible risks to the success of the project does not guarantee full funding, but not citing risks reduces the possibility of receiving full funding recommendations from the IPO

reviewers. Support was stated for doing more postimplementation analyses of projects and comparison of results to projections, to build a body of state experiential knowledge. However, no clear rewards were noted for the individuals preparing the proposals, despite a consensus of opinion that there should be rewards.

The possible reasons for these perceptions and outcomes will be presented in the following chapter, as well as suggestions for further research to explore the way funding decisions are made.

Chapter 5

Summary, Conclusions, and Recommendations

Introduction

Organizational decision makers have struggled to identify all the benefits of using computers since they were first introduced. Investing in technology is a leap of faith for managers, as computer hardware and information systems had no comparable precedents other than factory equipment and operators. As managerial understanding evolved of the value brought by information systems, managers raised their expectations for the contents of the investment justification arguments. The theoretical basis for information systems bottom line effects, as well as the strategic positioning, supported changes in the investment rationalization models. The benefits of information systems went far beyond the efficiency increase.

To understand how state government officials of Minnesota proposed and funded major IT investments, the researcher analyzed IT investment proposals and interviewed key state employees who created, reviewed, and funded the proposals. The results reinforced the importance of the agencies presenting well-researched, fully substantiated cost/benefit arguments that addressed risk and contingency measures. Not surprisingly, there was a diversity of opinion about what should be included in a proposal document among the preparers, reviewers, and funders. There was a consensus opinion for follow-up verification of the proposal estimates for all major projects.

The research framework was a combination of correlation research (between the funding recommended and received and the variables in the contents of the proposal documents) and a descriptive survey of a sample of the key individuals involved in the funding process. The variables identified in the proposals included risk identification,

funding recommended/received, the quality/completeness of the presentation, mention of soft costs/benefits, mention of strategy, purpose, and second order effects. The variables in the individual interviews included demographic characteristics, the IT experience/training of the individuals, preferred proposal factors, rewards for proposers, value of IPO evaluation, influence factors, and review process changes. The research design was not able to measure or control for political agenda, legislative party views, individual IT knowledge, agency time in preparation of proposal, relative power bases of individuals, and the priorities for the pool of funds available for projects.

The analysis of the results is presented in two sections. The first section discusses the proposal components and factors, including presentation quality, citation of soft costs/benefits, project positioning, and citation of risks. The second section addresses the interviewees' characteristics affecting their perception of the state's IT proposal process. Recommendations to the state for proposal content refinements, postimplementation analysis, reward structures, and process are discussed. Suggestions for additional study are also presented.

Value of Proposal Presentation

Poorly prepared and presented proposals received less funding than well-written proposals demonstrating the value to the agency investing in their creation. A well-prepared and presented funding request indicated the care and time spent by the agency in stating the case for investment, as shown by 96% of the interviewees citing presentation quality as critical for funding approval. Tables 3 and 9 show that the IPO reviewers were less influenced by the presentation than the legislators, likely due to the additional base of knowledge the IPO reviewers possessed. Tables 4 and 7 show that the legislators were more likely to fund well-prepared proposals. They probably perceived the agency as

being serious about the request when submitting well-presented requests, and capable of executing the project as well as it executed the proposal document. The results support the conclusion that agencies should spend time and care in packaging the proposals to create the maximum positive impression on the reviewers and funders.

Similar types of production resources and tools were available to each of the 128 state agencies. However, it was not possible to control for total time invested in preparation, the degree of research conducted, or the knowledge bases and attitudes of the individual preparers. The degree of completeness of (a) disclosure of risk, (b) compliance with IPO standards for proposal format and content, (c) inclusion of soft factors, (d) quality of proofreading, and (e) anticipation of possible reader questions was the decision of the agency IT champion presenting the proposal. Depending on when the agency started the process of preparing the proposal prior to the deadlines for IPO review and the availability of qualified agency staff to prepare the proposal documents, varying amounts of proposal preparation time and skills were used. A few of the preparers pointed out the dilemma they faced in assessing the payback value of the time/resource investment required to produce a fully researched proposal with accurate estimates. The risk that the proposal may not be funded could necessitate redoing all the preparation work in the next legislative appropriation cycle two years later. The agency CIOs stated that they were reluctant to take critical resources from ongoing agency projects to create perfect proposal documents, with no certainty of receiving funding. The conundrum was expressed by all three agency CIOs interviewed. The timing cycle of the legislative funding cycles was also cited as problematic, because major project needs arise between the legislative sessions without opportunities to seek funding.

The almost even split between the proposals rated by the researcher as extremely well-prepared and adequately done (Table 1) could be explained by the sample characteristics. The poorest quality proposals were either rejected by the IPO reviewers prior to formal review or retracted by the agency after hearing the IPO reviewers' evaluations of the proposals. The proposals that finally made it through the IPO review process had been corrected, amplified, and made as good as the agency thought they needed to be. All agencies had similar resources for word processing and binding of proposals, with the final choice being up to the agency CIO. Different perceptions by agency CIOs of the components of a good quality presentation, and their willingness to invest more critical staff time, could explain the rest of the differences in final quality of proposals. The CIOs may or may not have been aware of their personal reputations or how highly the legislators regarded the agency's ability to successfully implement a project. The political agenda of the governor and legislators, as well as the total pool of available funds, may not have been known by the CIOs when the proposals were prepared.

The legislators are analogous to an audience of executives who must be sold on the idea of the rewards of funding the project, as well as the trustworthiness of the agency in successfully carrying out the project to its conclusion. Since many of the legislators did not have the depth or breadth of IT knowledge of the agencies or current information system evaluation techniques as the IPO reviewers (Table 15), the written document takes on additional importance in demonstrating the agency's competence to the legislators and their staff. The legislators' staff members may spend more time examining the written document than the legislators, but only they receive private lobbying efforts.

Importance of Soft Costs and Benefits

Similar to other researchers' findings about the importance of presenting balanced presentations of types of evidence, the data showed an almost even split (52% versus 48%) in the perceived value of citation of the soft costs/benefits by the interviewees. At least half the people in the sample were aware of the value of portraying a realistic picture of all the components associated with successful project implementation. The results show the perception gap, despite IT industry experience demonstrating that soft costs can be up to half of the total project cost. With potential soft costs so significant, the researcher concluded that it is important to quantify the estimates and include them in the proposal documents.

The IPO and Office of Technology did not have a standardized model for estimating hard and soft costs and benefits (according to the interviewees). This may be the source of the interviewees' skepticism about the value of including soft costs and benefits in the APDs, as shown in Table 20. Fifty-nine percent of the proposals did cite soft costs and benefits, demonstrating the importance most of the agencies placed on presenting a full case. Many variables influenced the identification and calculation of the full scope of costs and returns, reinforcing the need for a consistent model used by all agencies. The time span for the operating/maintenance estimates in the proposals had recently been expanded to three years (post-implementation) by the IPO in recognition of the software's expected life span. These additional data were designed to provide the decision makers with a context of on-going operating and maintenance hard costs, as well as increasing their awareness of normal maintenance and enhancement costs. Due to the lack of a commonly accepted soft cost and benefit estimation model, the readers of the

proposals were required to use their intuition (and confidence in the proposing agency and CIO) to assess the accuracy of the estimates.

The lack of influence of citation of soft costs and benefits on the IPO reviewers, as shown in Table 9, may have been because the reviewers were already aware of the benefits because of their strong IT knowledge and deeper knowledge of the agencies. The IPO reviewers may have thought that the agencies were internally responsible for handling the soft expenses incurred by the project and delivering the soft benefits. The agencies may not have cited the soft costs and benefits due to lack of a commonly understood statewide estimation model, and the fear of being asked to justify the quantified estimates in the written proposals to the legislators.

Table 10 shows that the legislators were not influenced by the mention of soft costs and benefits. While the most compelling rationales for IT investment include soft benefits, but most government decision makers focus on the hard dollars when allocating scarce public funds. Recommendations for the types of measures include (a) increased capability to meet strategic goals; (b) increased effectiveness (beyond efficiency); and (c) improved communications, both internal and external. Attaching hard dollar values to these measures is difficult at best. One alternative is to contrast the investment cost of doing the process completely manually or to estimate the opportunity costs of not doing the project at all. This technique could be utilized by the state agencies to make a strong comparative case to the legislators.

The citation of soft costs and benefits is not consistent in the APDs, especially when the state's accounting systems measure only hard dollars. Educating the funding decision makers about the variety of types of costs and capabilities that agencies can

experience from IT investment will broaden the scope of types of justifications the agencies can use. More IT education for the end users can affect their dissatisfaction with the resulting systems. The value of the strategy of providing more IT education for the funders could backfire if their expectations for the investment returns also increase as a result of the more current IT knowledge.

Value of Positioning of Project

Positioning projects is a critical part of constructing the investment argument, but the proposals in this sample did not consistently cite support of strategy. Positions can include a project as part of a larger strategic effort, mandated by external authorities, or replacing outdated systems. Agency strategy support was cited in 71% of the proposals, and state goals were noted in 53%. Tables 11 and 12 showed that projects positioned as part of a larger strategic effort received a higher level of funding recommendation from the IPO reviewers, but there was not a statistically significant difference for legislative funding levels. The IPO reviewers recommended full funding for all the projects cited as strategic in purpose, contrasted to only 20.6% of the projects recommended for full funding that did not have a larger strategic context. This is likely due to the deeper IT knowledge and training of the IPO reviewers, as noted in Table 15. The IPO reviewers are also much more intimately acquainted with the individual agency goals and statewide IT plans than are the legislators (by IPO reviewer self assessment). Current IT theorists support the strategic role of IT projects in process transformation, which is diametrically opposed to the early view of IT as a replacement of manual labor. The IPO reviewers had more current IT training than the legislators and knew the value of IT supporting an agency or state strategy. The legislators (with less formal IT education) may be more

heavily influenced by other factors such as document appearance (Tables 4, 7, and 8), reputation of the agency and CIO, and other political exigencies.

The overall information technology plan for the state, as well as the agency's own strategic long-term goals, are not well-documented or understood by the legislative funding decision makers. The IPO reviewers do have access to the statewide strategic plans that exist, as well as some intra-agency strategic plans, providing them with a perspective different from that of the legislative funders. The legislators view the IT proposals within the context of larger, politically expedient program initiatives for the state (but not necessarily within a larger IT planning context) and the political implications of the agency's services to citizens. The public does not always place a higher value on improving agency effectiveness when compared to taxpayers receiving rebates. Legislators are faced with the political image dilemma of using scarce funds for new IT systems, citizen rebates, or feeding and housing people, and are keenly tuned to the public sensibilities about direct results of use of tax dollars.

The holistic nature of organizational planning to improve communications, operations, and planning dictates the establishment of building blocks of IT systems. This need often makes the investment argument move to a higher level than just financial measures. Explaining an individual project in the context of a larger portfolio or strategic initiative may take more effort, but a persuasive argument often requires demonstration of the role of the project as a building block to reach the ultimate goal. Having less than half of the respondents cite the importance of strategy context in proposing individual projects may be indicative of the lack of awareness of the need to position the projects in a broader context, or of being resigned to the limitations of the state's funding structural

design (i.e., single agency funding only). The agency CIOs may have been trying to minimize the appearance of the proposal to the legislators in hopes of securing funding.

Many agency CIOs cited the importance of the IT portion of a larger strategic effort as a critical enabling component and difficult to separate from larger efforts creating new ways of delivering the services of the agency. One IPO reviewer cited the lack of middle managers' understanding of the value of placing individual projects within larger strategic projects, but the CIOs stated that they understood the importance of doing so. The bias of the legislative staff member who wanted to isolate computers into a single budget item reflected the lack of understanding of the power of using information systems to support the implementation of a larger agency program.

Value of Citing Risk Assessments

By their own description, the agency CIOs treat the funding proposal process as a bargaining game with the legislators. The CIOs know the types of resources needed for their agencies to provide critical services, but the CIOs have to estimate the hot buttons of the legislators to obtain funding. The IPO reviewers valued the inclusion of risks in proposals, as evidenced by not recommending funding for 83.3% of the proposals without risk (Table 13). However, there was not a significant difference between the legislative proposal funding levels for proposals with and without risk (Table 14). The importance of risk assessment was confirmed by the open-ended question responses from the respondents. Thirteen of the interviewees asked for more information in the proposals about the types of risks to success and what the agency can do to control them or reduce the effects. The IPO recommended higher levels of funding to APDs citing risk, which may be due to the reviewers' more extensive and recent IT practice knowledge. The researcher concluded that assessing risks in project execution is a critical component of

presenting a complete project scope. Without acknowledgement of risks and mitigation plans, the agencies appear overly optimistic and unprepared for eventualities.

Public sector funders worry about failed projects being headlined in the public media, reducing the taxpayer's trust in government. Comments demonstrating that fear were made by some of the individuals interviewed. The researcher found handwritten notations in the margins of the proposal documents (e.g., "WCCO," a Minnesota television station, with investigative reporters known for pointing out the suspected foibles of public officials and employees). One agency CIO reported that he told his staff, "Never give me estimates that will get me in the news when we miss targets." The Assistant Commissioner of the Department of Administration, to whom the IPO reported, was adamant that any public misperception of misuse of public funds was to be avoided, and she communicated that repeatedly to all managers in her department.

The interest in risk assessments serves as an incentive to the agencies to address risk in the proposal document, and for the IPO to require statements of risk and contingency planning in APDs. Statewide standardized estimation models for risk factors are needed to give credence to the agency scenarios. The IPO had distributed a model for identifying types of risks with the instructions for building proposals, but not all the agency staff understood or used it (S. Kline-Stensvold, personal communication, February 13, 1995). More training of the agency staff in planning for risk containment is needed, and endorsement of the model from the legislators would validate and stimulate its use in proposals.

Avoidance of risk is one of the highest concerns for public servants, supporting the recommendation that risk should be addressed explicitly. Citing risk reassures the

decision makers that the project has been analyzed from all perspectives and that plans have been made to contain the manageable risk. The interviewees supported this concern by invoking past projects that were considered failures and made headlines in the local media (e.g., Statewide Systems Project). Cost overruns on estimates were an overriding concern for the legislators interviewed. One agency CIO stated that he would never put anything in a proposal that he could not live up to, because he would be held accountable for it. The CIOs want to present as positive a case as possible to the legislators, and they have to balance predictions of reward with cautions. Risk categories include (a) productivity/performance enhancers, (b) management support, (c) competitive advantage, and (d) levers for organizational restructuring. A project could fail to produce results in any of the areas. Legislators only mentioned productivity/performance improvement expectations but did not know how to establish metrics. While competitive advantage may be perceived as irrelevant for governmental services, competition is real, because many government services are being contracted to private party outsourcers (e.g., prison management). Users of the government agencies' services set their expectations based on private sector service benchmarks, and they are very critical when the government services fall short of expectations.

Citing any risks in proposals was deemed to be a poor strategy by agency CIOs who had a self-described hostile relationship with the key legislators chairing the IT funding allocation committees. The CIOs perceived that any admission of weakness or possible failure points would be seized on by legislators as a reason to not recommend full funding for the request. A senior legislator cited her suspicion of the agency's lack of objectivity to accurately recognize or estimate its own points of vulnerability. The IPO

reviewers were perceived by the legislators as being more objective, thus able to more accurately assess risks. However, there were no conclusive statistical results about the funding for proposals with and without risk citations. This finding reinforced the degree of funders' skepticism about agency preparers' strategies in preparing proposals. Agencies engender risk by providing full disclosure of possible project failure points and some CIOs may be reluctant to present failure points. The researcher recommends that risk management strategies be mandated in proposals, to level the playing field and present a balanced perspective.

One type of risk is having sufficiently capable IT staff to implement the project. Attracting, compensating, and retaining experienced CIOs to state government is a continuing challenge for several reasons. The state's employee pay scale is significantly below market levels, due an outdated legislative requirement that no state official can be compensated more than the governor (despite prevailing market conditions). Working with the procedures and constraints of a government personnel policy/multiple employee union environment often requires more adaptation than qualified candidates are willing to exert. Another disincentive for CIOs new to government is that private sector performance metrics and arguments for IT investment often cannot easily be applied. In addition to the difficulty of bringing in qualified CIOs, similar problems exist for all types of technical staff positions (e.g., programmers, analysts, telecommunications experts). These challenges all serve as incentives to outsource entire IT shops to solve the government's IT staffing difficulties.

The IPO reviewers had a more intimate knowledge of the workings of the agencies and the possible failure points due to working with staff at middle management

levels, as well as working with the agencies over a longer period of time (than the legislative group). The IPO reviewers' skepticism about the degree of risk in a project was amplified by their personal prejudices about the ability of the agency to carry out the project. Several reviewers advocated the use of an objective assessment of each agency's IT maturity, citing the Software Engineering Institute's (SEI) capability maturity model to assess the ability of each agency to successfully implement an IT project. Using the SEI model would provide an unbiased, consistent tool to create a context in which to evaluate the risk for discrete IT project success. The researcher supports the recommendation to use the SEI model.

For the IPO/OT to train agency staff on using any risk estimation model, a higher level of trust between the IPO/OT and the agencies would have to be developed for the training to be effective. The CIOs had a self-described hostile view of the IPO reviewers, due to their past criticism of agency proposals. Without Statewide CIO and IT strategy, there is little incentive for the agency CIOs to cooperate with the IPO. However, due to the current differences in IT acumen of the preparers and levels of distrust, the agency CIOs were not open to improving their working relationships with the IPO. The high levels of trust the legislators had in the IPO only exacerbated the agency resentment of the IPO. The CIOs needed to better understand the consequences of failure on their long-term legislative reputation by hearing directly from the legislators, rather than indirectly by lack of funding allocations. Worthwhile projects may not be funded to punish the CIO, but the consequence is that the service recipients are negatively affected.

In addition to having a statewide CIO to mandate the use of a risk estimation model, the CIOs could be further motivated to use the model if positive results came from

applying it. Evaluation of actual project results against what was in the proposal would reinforce the use of the risk estimation model. The management of potential risk is ultimately the agency's problem, but the value of acknowledging the risks at the start of the project demonstrates the foresight of the agency CIO in preparing for adverse situations.

Ensuring common viewpoints of end users, senior management, and IT professionals is challenging when individuals have disparate IT educational levels. Awareness of the value of anticipating and mitigating risks is one means of increasing the citation of risks in APDs, along with tying successful funding to complete investment cases. Introducing the involved legislators (newly elected as well as established) to the value of anticipating and reducing project execution risk would be part of the education process, to reduce any negativity associated with disclosure of risks. The researcher recommends that the legislators and CIO foster an environment of openness in presenting realistic investment cases (with risks and rewards stipulated) for better planned and managed projects.

Because of the difficulty of getting all the critical parties to a common level of understanding and awareness, one strategy to improve the process is to reduce the number of individuals involved in making the funding decisions. Since the legislators have already demonstrated the high trust level they have in the IPO review and recommendations, they could employ one of two strategies to fund IT projects. The legislators could allocate a single pool of funds every biennium for all IT projects that the IPO/OT reviewers could allocate to agencies. The downside of that method is that it would only increase the animosity of the agency CIOs toward the IPO reviewers. The

easiest method would be to stop the practice of segregating the IT portion of agency initiatives and integrate supporting IT into agency initiatives with IPO evaluation of the IT segment. Both approaches would remove the legislators from having to evaluate IT proposals without a supporting base of training. The researcher recommends the latter approach because it is more representative of the reality of the role of IT in facilitating execution of larger agency programs.

Characteristics of IT Professionals and Decision Makers

Further clouding the determination of which factors should be in APDs are the disparate information needs of the key players in the funding process (based on training and priorities). The interview results highlighted asymmetries between APD preparers, reviewers, and legislators in their educational preparation and years of experience with IT (Table 15). The background and resulting significant perceptual differences are understandable because of the requirements for each type of job. Overall, the entire group was mostly formally educated with (the highest degree earned being) 58% post-baccalaureate and 33% post-masters. Several had doctorates, but only two had university-level MIS training. The agency IT staff had higher levels of experience in IT and with proposals than the legislators, which was not surprising. Legislators come to their elected positions from a variety of backgrounds and act in a wide range of decision-making roles, only one of which is evaluating IT proposals. The IPO reviewers had the highest levels of experience in IT and with proposals, but that could change if the interviews were repeated with the most recent group of individuals in the IPO. There have been significant turnover in the IPO reviewer staff members (almost 60% due to retirements and resignations) between 1996 and 1998 (G. Peterson, personal communication, August 11, 1998). This rate of turnover was not substantially different from any IT organization

in the late 1990s, due to the volatility of the IT job market and the lure of higher salaries elsewhere (Towns, 1998).

With the reality that there is (a) turnover in the elected legislators, (b) a variety of levels of expertise and training in the agencies, and (c) turnover in the IPO reviewer staff, two options are possible. The first is to not let anyone with insufficient knowledge participate in the process of preparing, reviewing, or funding IT proposals. Since that is not feasible, the researcher concluded that frequent training is needed to improve the symmetry of expectations and understanding. Holding training sessions prior to the start of the proposal preparation and review cycle would improve the quality of the entire proposal generating and review process and reduce rancor between the individuals. To increase the common level of current MIS knowledge and awareness of possibilities, specific training on current positioning, justification, and proposal components is warranted for all those involved in the IT proposal process. While traditional semester-long college courses would not be appealing or appropriate, specially designed, intensively focused training sessions designed to create a common knowledge base would improve the participants' parity of knowledge. Training on IRM concepts, current investment justification strategies, methods of consistently quantifying soft costs and benefits, the value of well-crafted presentations, the evaluation of risk, and the role of IT in enabling successful deployment of statewide/agency strategies would provide a common cognitive framework. Instead of agencies creating their proposals in isolation with minimal guidance, additional group training could serve to improve the collegial working relationships of all key parties by establishing a common knowledge set.

The three key groups in the proposal process had different perceptions of each other's motives in relation to the proposed IT projects. Relative career time frame expectations varied widely by the respondent's role, which also influenced individual motivations. Legislators depend on winning the next election to return them to public office, or they may aspire to higher levels of office. To appeal to external audiences, the legislators prefer to support projects that are likely to be successful and serve a popular political agenda. The public also holds legislators accountable for carefully investing state funds. In contrast to the legislators, the agency and IPO personnel were primarily serving an internal audience through excellent performance in their jobs. They had longer tenure in the state system (moving between agencies during their careers), and were vested in sustaining careers within the state through successful project affiliations. The common theme was the desire to associated with successfully implemented projects.

Cognitive styles and implementation apprehension are two major factors in differentiating user perceptions. While individual cognitive styles were not formally measured by the researcher in this study, implementation apprehension was one of the most frequently mentioned concerns in the study group. The optimistic agency CIOs wanted the IT projects to enable the agency to transform existing processes with increased service quality levels, but the pessimistic legislators suspected the CIOs of padding project estimates to garner more funds (hence expanding agency power through budget size). The general fears of failed project implementations could be mitigated by objectively evaluating the risks of a project through SEI maturity index ratings of agencies and requiring the inclusion of risk assessments in all proposals.

The legislators created IPO as a review function and continued to hold their work in high regard. Some of the CIOs viewed the IPO review as an unnecessary process impediment imposed by the legislature, while others valued the advice and guidance provided by the IPO. Most of the agency CIOs also had a combative view toward the legislators and were frustrated by the mandated preliminary IPO review process. Several legislators commented on giving the IPO/OT more authority to exercise a veto on poorly done proposals, and they requested that the IPO/OT staff spend more time with the legislators' staff members to explain costs and benefits of each project proposal. One of the legislators wanted the IPO/OT to conduct post funding project progress assessments and annual continuous risk management reports. The researcher supports those ideas to add to the repository of statewide knowledge about IT project estimation and management.

Using education to increase the general level of awareness and knowledge about effectively using IT is needed to ensure that the state's IT resources are used most effectively. On-the-job training was the most frequently cited source of IT knowledge by all three groups (100% to 88%), which reinforced (a) the value of experiential learning and (b) the need for more training on current IT theory and external practices. One of the limitations of vendor training is in the biases and currency of theoretical knowledge of the presenters. The legislators had the least IT education and depended heavily on their staff to review the details of the proposals. Shaping attitudes towards IT through education, experience, and behavioral reinforcement reinforces increasing the levels of internal training for those involved with the proposal preparation and review process.

The lack of formal university-level, theory-based education in IT issues for the people interviewed for the study is not surprising, due to the many types of educational backgrounds for the individuals in this sample. IT training is not required in political science or law school programs, which were frequent educational backgrounds for those interviewed. The majority of public administration programs do not require management information systems training, and very little about public sector IT management is published in major public administration journals (Northrup, 1999). The comments from the respondents indicated that there is a disparity of common language and common conceptual frameworks, but the legislative staff members did not indicate any desire to learn more about IT principles or current practices. A program of mandated training for better communication via commonly understood concepts and language in the proposals is recommended by the researcher. Training is only effective with engaged, motivated participants. If that does not occur with legislative staff members, then removing the legislators from the detailed decision making on IT proposals is warranted.

On a scale beyond the public sector, more continuing education for all organizational decision makers on information systems management theory and current practice is required to reduce the asymmetries between the decision makers and the technologists. Technologists have had to adapt by learning to speak the language of their business audiences, but the organizational executives and decision makers also have to become knowledgeable in the strategic aspects of using information technology.

Proposal Success Factors

The systemic, complex series of factors that influence the eventual funding for a proposal are difficult to identify, and it is difficult to predict their interaction. The apparent contradiction of why less than well-prepared proposals receive funding is due to

the intangibles of legislative political agenda and perceptions of agency CIOs. The challenge of determining the effects of single elements in interconnected systems like governmental structures requires understanding of element interactions within a system. The interactions are so random and complex that is it almost impossible to predict cause and effect of individual elements. Using this premise, the relative importance of the written proposal, compared to the verbal lobbying done by the agency, is impossible to determine. Negative (or positive) verbal comments about the agency or key staff members, the perceived political clout of the project, and the biases of the decision makers all affect the final funding decision. To reduce the elements of complexity, fewer individuals should be involved in the proposal review and funding. The uncertainty of the perceptions and proposal promises would be reduced with consistent postimplementation validation of outcomes against estimates.

Agency CIOs appropriately questioned the time and energy required to produce APDs, when the legislative committee presentation and agency reputation may outweigh the value of the document. CIO and agency reputation were perceived as the most important factors in obtaining funding by 50% and 60% (respectively) of the respondents. There was not a majority opinion about the value of strategic project fit or citation of risks in the proposals. The IPO and legislators thought the written document's quality was important as demonstrated by the better quality APDs being more likely to receive full funding (Tables 4, 7, and 8). Some agency interviewees cited the executive leadership of the agency as the most important factor in successful funding. Other agency interviewees cited political media image agenda as valuing social programs over projects intended to increase efficiency and reduce operating costs (e.g., feeding children versus buying more

computers for government), but none of the legislators stated this observation. These conflicting views led to confusing directions for the agencies in preparing proposals.

The legislators observed the agency CIOs while making presentations to the funding committees, but didn't know the agency staff members. The agency CIO has to advocate for the ability of his/her agency to effectively produce the services and programs. One legislator said all he wanted to see was an executive summary of the bullet points of the project presented, and his staff members could review the proposal detail. Some agency CIOs thought that the legislators only read the IPO proposal review assessment, and ignored the detailed, multipage proposals. This may be true due to the number of documents that legislators have to process in a session. The legislators' staff members do read the proposals in detail. However, several legislators noted that colored, moving, computer-generated committee presentations could not overshadow a poorly researched and prepared proposal document. A well-crafted, complete proposal does not solely guarantee successful outcomes (due to a myriad of other factors), as Sun Tzu (1991) observed about planning battles over two centuries ago.

Proposal Estimate Verification

The assessment of actual project results against the original estimates of any project may be done informally or rigorously (especially when the project fails). Interviewees were almost evenly split between feeling comfortable about estimates and not, but over 70% of the respondents supported follow-up of the results. The researcher also strongly advocates conducting postimplementation reviews on all projects. There is value in developing a deeper understanding of the effectiveness of the estimating and execution process, and documenting it. Follow-up on promised results is rarely conducted because IT performance is so dependent on perception instead of quantified measures,

and the assessment process is expensive. The State of Minnesota legislative auditor's report on the Statewide Systems Project (1997) also recommended that postimplementation analysis of the project performance against estimates should be done for every project, in a formal manner, since it was not done consistently.

The researcher agrees that postimplementation analysis of every project should be conducted to support double loop, generative learning for the state. The researcher acknowledged the challenges of accountability, staffing, and funding from instituting the requirement. Several interviewees thought that it should be a responsibility of the Office of Technology (into which the IPO has been subsumed) to develop a statewide base of best practices and costs and benefits estimation models from proposals, with benchmarked performance standards for future IT projects. Identifying whether the estimates were made by IT professionals or end users should be noted also for comparison of accuracy and biases. The critical resource of qualified individuals with sufficient time to do a postimplementation audit of every IT project is not currently available within the state. Hiring unbiased external consultants to do these studies is a common practice in private sector, but the cost may be prohibitive for the state and would also not add to the state's intellectual capital. The researcher recommends reassigning current IPO/OT staff to do the evaluations, or to supervise teams of college interns, (with the plan to hire them upon graduation) to retain the intellectual capital created.

The feedback step after state project completion has not been done routinely except in cases of perceived failures of large magnitude (e.g., the Statewide Systems Project). Even in failure cases, project measures of success were not clearly defined. The initial Statewide Systems Project proposal was overly enthusiastic about the benefits

promised and the funds required to integrate previously disparate systems, causing accusations in the media of mismanagement and overspending. The sponsoring agency CIO thought the auditors cited some good project outcomes and the changed expectations over the life of the project. The initial cost and functionality promises made to the legislature by the project sponsor were more expensive to implement than projected. Legislators cringed when asked about the project and cited it as being too big (involving three major agencies) with too much convergence of change (hence, risk) of mission critical systems (payroll, accounting, and finance). Having the CIO come back to the legislature in the next funding cycle asking for more appropriations to finish the project was not perceived positively by the legislators. The sponsoring agencies pointed out that initial estimates were based on faulty knowledge of business process models within the agencies, as well as limited understanding of the purchased software capabilities. This experience indicates the value of the agency staff conducting more thorough research to support an investment proposal.

In addition to garnering initial funding, the written proposal document serves as a historical document to which the funders refer, especially when the project does not go as planned or the agency requests additional funds. The written document survives long after personal lobbying and committee presentations. The expected paybacks are documented, as well as acknowledgements of risk (with contingencies noted). One legislator disdainfully noted that PowerPoint presentations with color and flashing clip art did not impress her, and led her to question the credibility of the presenter. Investing the time in preparing a well-structured, well-presented APD has beneficial results for the

agency's reputation as well as increasing the chances of receiving the full funding request.

Establishing a formal review process at the conclusion of all projects would remove the stigma from having the legislative auditors called in on projects perceived as failures. If all projects were subject to review, a wide variety of metrics could be created. A standardized form for project metrics should address both qualitative and quantitative measures. The linkages from IT expenditures to program outcomes is part of the metric structure. Many people make an incorrect assumption about information technology being self-harvesting through reduced operational costs. Instead the benefits come from broader benefits that are often difficult to quantify.

Creating a statewide environment in which generative learning from project experiences is codified and shared with all agencies would ultimately benefit state government operations. Several interviewees thought strongly that the Office of Technology should create a repository of best practices for a corporate experiential learning memory to be shared with all agencies and regularly updated. The Office of Technology could function as a collaborative advisory unit with the agencies, to leverage the value of the collected lessons learned in IT management and projects.

Rewards and Punishments for Proposal Preparers

Interviewees cited no tangible rewards for the preparers other than improved personal reputation for creating successful proposals; however, most thought that there should be some type of reward. The agencies received a financial reward by receiving the funds to execute the project. The intangible benefit of enhanced agency reputation depends on the agency's ability to successfully execute the project within the constraints of the resources available. Successfully funded and implemented projects help the careers

of the key agency staff members through recognition of work done well. The most frequently cited punishment for doing a poor job was diminished reputation and not receiving future project funding.

The researcher concluded that doing a good job on preparing APDs could be reinforced through public recognition of those who created the successfully funded proposals in the common repository of project knowledge (created and maintained by the IPO/OT). Instituting postimplementation analysis would identify the estimates that were on target, and further recognize the skill and acumen of the APD preparers if their names are attached. Identification by name may also serve as an incentive for more carefully researched estimates.

The public sector does not provide outcome/performance rewards due to lack of fiscal connection between agency revenues and volumes/customer satisfaction levels. Instead public sector entities utilize a fixed salary and intrinsic rewards as motivators. The fear of negative media coverage about civil servants receiving monetary bonuses (and state personnel procedures and policies) deters agency management from offering monetary rewards for individual performance. A K-12 school district in Minnesota attempted to award bonuses to teachers whose students excelled in the standardized statewide tests. The protests from the teaching unions, as well as from the government watchdogs in the media, have dissuaded other managers from proposing such a radical idea again.

However, as the state struggles with recruiting and retaining qualified IT personnel, and having little leeway in creative rewards and inducements, the path is being cleared to outsource state IT functions to the private sector. The private sector has more

freedom for payments of bonuses and other tangible rewards. Freed of the strictures of the state government personnel and collective bargaining units, the private sector IT outsourcers are free to pay competitive salaries and devise valued rewards and benefits. The salary policies of the state severely constrict a manager's ability to differentiate between poor and exceptional performers (B. Conlin, personal communication, July 16, 1996).

State Process Level Changes

Many of the current processes required by the State of Minnesota for an agency to procure funding for major IT projects hinder effectiveness for the agencies and funders. The aspects of the process limits include (a) the biannual legislative funding cycles and committee structures, (b) the state's overall IT leadership and strategic planning process, (c) the locus of funding control reviews, (d) lack of common conceptual frameworks and proposal models, and (e) the procurement process of IT services. The bi-annual legislative funding cycles do not allow for mid-cycle funding requests at the time the agency identifies the project need. The designation of specific agencies to different House and Senate committees, along with the mandate that funding can only be allocated to a single agency, combine to deter multiagency projects.

The lack of a statewide IT strategic plan was recognized by the interviewees as a significant gap in state IT management, as was the lack of a state CIO. The researcher supports the designation of a state CIO, and construction of a statewide IT strategic planning architecture. The CIO and statewide plan can provide leadership and a context within which all the agency requests can be evaluated. The OT has potential for creating a locus of control and authority for IT within the state, but could come into conflict with the semi-autonomous larger state agency CIOs and IT staff organizations.

There are some powerful legislators and staff members who want to combine the agencies' IT expenditures into a single pool, instead of viewing the IT segment as a critical integrated component of each agency's program. This is indicative of a lack of understanding of the role of IT as an enabling tool for policy actualization and the researcher emphatically disagrees. Statements from legislative staff members indicating a desire to reuse computer resources demonstrates their lack of awareness of the rapid obsolescence of computer hardware and the nonreusable nature of custom developed software. The researcher supports integration of the IT segment of larger agency projects into the major project funding request.

A statewide IT plan will illustrate the critical linkages between projects and agencies' abilities to fulfill missions, demonstrating why funding only part of a larger project will not create the expected benefits to the citizens of the state. An integrated IT plan will also highlight the opportunities for potential synergy and information sharing across agencies. Shifting the planning perspective an increased time span and breadth will require significant education of the process participants and leadership of a strong state CIO. More education into state-of-the-art rationalizations for IT usage in strategic, as well as operational, modes is needed as part of developing a larger agency strategic planning process. The educational burden would be reduced by eliminating the legislators from the direct decision-making process if they were limited to approving a single pool of funds to be allocated by a smaller body of qualified IPO/OT staff.

Organizations have typically developed funding/purchasing procedures to reduce waste, duplication, and costs, then attempted to fit the purchase of computer hardware and software into those existing procedures. However, as the usage and potential IT

benefits for organizations have evolved over 30 years, purchasing procedures have often not been modified in response to the changes. The State of Minnesota requires that multiagency proposals be funded through a single agency inhibiting cross-agency project participation and sponsorship. The researcher recommends discarding this antiquated method with its inherent assumption that information is not shared between agencies, nor is it a statewide asset. A recent example of a multiagency project was the consolidated Y2K preparation project for all 128 state agencies that had to be housed in the Department of Administration for funding purposes. The single-agency funding structure impedes implementation of Statewide and interagency projects. It is a reflection of the 1960s legacy attitude of treating information systems as transactional automation vehicles, instead of recognizing their value for generating and sharing information. Because of the inherent political power associated with the allocation of funds for IT projects, the legislative committee chairs are not eager to design a new funding mechanism that would allocate comprehensive pools of funds to cross agency projects. A strong CIO would have to work hard to change this locus of authority.

To facilitate the evaluation of proposals for their ability to support larger strategies, the project funding decisions should be moved to a newly created, nonlegislative committee structure reporting to the statewide CIO. The committee members could serve in an oversight role for the legislature. The committee can be vested with accountability for monitoring project success and postimplementation verification of APD estimates. The committee members should be well-trained in current IT and MIS theory and practice, as well as statewide and agency strategies. This committee could evaluate

multiagency projects, as well as proposals outside of the every other year legislative funding sessions.

The researcher recommends eliminating the artificial legislative funding cycle requirement which created a rush to prepare proposals for legislative deadlines. This structure could also permit a leveling out of proposal reviewers' time demands and allow the agencies to submit the proposals when fully researched and prepared. The legislators would no longer have to function as expert evaluators, but instead perform their other critical duties.

Attempting to isolate the IT funding portion of a larger agency program is specious reasoning. Isolation of IT is rooted in industrial age attitudes that identified the computer hardware as the major cost (ignoring larger software development, conversion-implementation, opportunity costs, and training costs/benefits). Separation of computer hardware budgets only creates unnecessary complexity in budgeting, and makes the demonstration of benefits to programs difficult. Understanding the full range of positive and negative effects of a new program puts the IT enabling portion necessary to implement it into an appropriate context. The significant value of any IT investment is the information collected, shared, and used to support critical decision making. The hardware and software components of a new agency program is as critical to its success as the people, office furniture, or administrative procedures.

A governmental unit does not work in isolation any more than a department of any organization would work without interorganization interaction. Any budgetary decision-making committee allocating funding to information systems projects has to consider the context of the entire organization's short- and long-range strategies in setting priorities.

Evaluating only the investment costs and benefits for a single department or operating unit presents an unrealistic view of the gestalt of the information asset of the organization. Enterprise resource planning (ERP) systems force the larger view, however many organizations have not reached the point of adopting that philosophy yet.

Proposal Format Recommendations

The appropriate framework of the proposal contents are a continuing source of debate for academics as well as practitioners. The appropriate contents of proposals are dependent on the investment justification framework used: (a) return on investment, (b) cost-benefit analysis, (c) return on management, and (d) information economics. IT benefits are qualitative, diffuse, and indirect complicating the accuracy of estimating their value. With the disagreement between researchers about the most important features of proposals, it is not surprising that there was little agreement among those surveyed. A few respondents admitted they had no idea what some of the IRM constructs/terms meant or how to use them in proposals. This finding was not expected considering the amount of training that had been provided when the IRM construct was endorsed by the legislature. However, the agency resentment towards the IPO's oversight authority may have influenced the agency participants to not be fully engaged in the training sessions.

The finding that executive leadership was the most highly ranked factor perceived in the success of the proposals lends credence to the sales nature of the CIO role (Table 19). The researcher concluded that the agencies and CIOs needed to invest their efforts in improving their reliability and creditability with their peers in the state. The agency CIO is expected to advocate for the agency programs and IT support, and take accountability for projects outcomes. The reputation of the agency/staff followed a close second to the importance of executive leadership in Table 19. That ranking is supported by other

researchers, and the researcher noted that personal assessments of the agency individuals was stressed repeatedly in the informal interview comments. Strassmann (1996) stated flatly that managing IT is primarily a matter of politics, and only secondarily a matter of technology. Most agency CIOs agreed with that after sitting through funding presentations. With relatively long tenure within the State, IPO reviewers had their own opinions of agency and staff reliability and quality, as well as CIO effectiveness. The political dimensions of proposals include the relative authority levels of individuals, the other requests from the agency, and public perceptions of program need and benefit.

The proposal format factors associated with the effective implementation of IRM models in the agencies were ranked the least important (e.g., high level resource plan, second order benefits, and degree of flexibility). Several respondents admitted they never did understand the IRM model imposed on all agencies by the IPO, nor did they feel it was important. Only one CIO had enthusiastically implemented the IRM model, but admitted she was only able to accomplish that at the top agency management levels, and was unsuccessful in having it accepted by the agency's middle managers who had little IT training. The IPO did not have sufficient staff numbers to effectively put IRM into awareness and practice in all 128 state agencies. After the IPO was absorbed into the Office of Technology (OT), the IRM concept was considered dead by many agency CIOs but not by the IPO.

Continuing to require the use of the IRM constructs in the APDs is unlikely to achieve a consensus. The researcher concluded that while IRM had theoretical support (and the support of some individuals), the agencies held so many negative associations with it that replacing it with a new framework would be more effective. The balanced

scorecard concept (Kaplan, 1994; Kaplan & Norton, 1992, 1993, 1996) has been widely accepted for evaluating IT investments in many private and public organizations. Peer acceptance of the balanced scorecard evaluation model for new projects, as well as evaluating on-going operations, is widespread. Many consultants with subject expertise are available to train and implement the tool, ameliorating the staffing challenge for the state. A statewide CIO is needed to implement any new standards, and the Office of Technology is a logical home for such a position. Either the IRM framework has to be shown to be effective in securing funding and managing agency IT, or a new conceptual framework for priority setting for IT investments needs to be selected.

While the interviews provided no consensus on which factors should be in the proposals, many respondents had ideas about other factors that should be included. One seasoned veteran of IT and the state thought strongly that data security and privacy issues needed to be part of every proposal. Another individual thought strongly that cause and effect relationships of the IT functionality (or lack there of) should be cited in every proposal. Articulating how the IT proposal supported the ability of the agency to enact policy or legislative directives was also strongly requested by several interviewees. The need for consistent performance and return on investment benchmarks was also requested. Interestingly, only one interviewee thought strongly that every proposal should have a section addressing the use of the WWW and the North Star home web page of the state for dissemination/collection of information. The researcher concluded that the current proposal format does not meet the needs of the individuals involved in the process, and a new format needs to be designed and negotiated.

The researcher believes that the proposal format can be improved by increasing the breadth of the types and number of categories of costs/benefits cited. Adding citation of possible risks and mitigation strategies to all proposals is needed. Incorporating more soft costs and benefits aligns with the literature recommendations and provides a balanced view of the new system. Creating a standardized model of estimation of soft cost and benefit methods will improve the acceptance of the estimates in the proposals. Unclear quantification and estimation techniques for the APD creates opportunities for misunderstanding unless the methods and formulas are clearly articulated, standardized, and accepted by the preparers and funders.

Developing a model to aid agencies in identifying soft costs and benefits, and then consistently applying it to proposals, will level the competitive playing field. Mandating the inclusion of specific citation of risks and mitigation strategies will also reassure the funders of the competence of the preparers. Doing postimplementation evaluations of the estimates will lend credence to the model through validation, aid in the development of metrics, or result in revisions to the estimating techniques. Creating an even more prescriptive proposal format than the one currently used will require a comprehensive, cooperative effort and a statewide CIO in order to implement it. The discussion and negotiation process with the agencies can serve to increase the understanding of how to use the new proposal template and costs and benefits estimation methodologies. Educating preparers and funders on the implicit and explicit assumptions will be necessary to make a standardized estimation model effective.

Proposal Format and Review Process Summary

The proposal format needs to be revised to use the balanced scorecard approach, replacing the IRM constructs which are not universally understood or accepted. A

statewide CIO is needed to head up an effective IPO oversight and support function for statewide IT planning and deployment. Using the SEI (Software Engineering Institute) Maturity Index to rank each agency annually for their ability to manage IT resources will present an objective measure of agency ability. Getting the agencies to accept the SEI model and scoring would be challenging, but it would save the IPO from having to develop their own set of standards.

The presentation format of the proposal needs to be structured to serve several audiences of reviewers with summary and detailed estimates and assumptions. An IPO/OT endorsed, consistently used soft costs and benefits estimating model for the entire state is needed. Risk identification models should also be included in every proposal. The full proposal becomes the permanent documentation of the original vision of the project, and additional later funding requests should be compared to the original document. Adding a postimplementation evaluation of the projects will complete the iterative learning cycle for agencies and reviewers. Developing and maintaining a statewide body of experiential knowledge about project estimation and execution will benefit all agencies.

The process of funding allocation should not include direct legislative review of IT proposals. Either the IT segment of larger programs should be incorporated into the overall agency program, or the legislators should set aside a pool of IT project funds to be distributed by IPO/OT staff knowledgeable in evaluating IT proposals. The challenge of educating the legislators would be eliminated by either option, and result in a less political allocation of IT funding from a speciously formed set of assumptions and prejudices.

Asking executive decision makers to evaluate the worthiness of technical proposals is difficult even in the best circumstances, but it is further exacerbated when the proposers present logical, quantified, tactically focused data and the decision makers prefer supporting data that address emotional, political, and immediate cost saving issues. The reasons for granting funding to IT proposals may well not be logical or rational at all. The finding that poorly prepared proposals were still funded supports Strassmann's (1996) assertion that managing IT is mostly about politics. The lesson for individuals preparing proposals is to understand the data preferences and decision-making criteria of the decision-making audience, and then provide the data desired.

Recommendations to the Field and Other Researchers

Further studies can reach outside of Minnesota, inside the state or into more detail on specific proposals or influential variables. Research on the identification of unarticulated biases of the principles of the review and funding process may yield insights into effective proposal construction. Controlling for variables such as political agenda, legislative biases, and objective measures of individual IT acumen may produce further knowledge about preferred proposal contents. Further in-depth study about the impact of the physical proposal presentation, crafting quality, and use of graphics on receiving legislative funding could provide guidance to the agencies in assessing how much time to invest in preparing proposals.

A researcher qualified to evaluate the Myers-Briggs Type Indicator (MBTI) or a similar type of instrument could use the tool to assess the decision-making styles of the proposal preparers and evaluators. The asymmetries or similarities of styles can provide insights into the construction of effectively presented arguments for funding. The types of

data (hard, quantified versus feelings or emotional aspects) and the presentation format could be tailored to meet the information needs of the individual decision makers.

To augment the results of the analysis conducted, a similar study could be done on the State of Minnesota proposals from subsequent legislative funding periods. The changes in personnel, proposal format, and the state political environment would have to be factored into the study, but the changes or similarities would be enlightening since some of the key legislators have not changed. Evaluation of the political agenda of the governor, the political parties, and the individual legislators with the funding granted may reveal interesting relationships and insights. Measurements of biases before and after education would also be enlightening in assessing the value of the education.

In-depth case studies and action research (both during and after the process) of how major IT proposals are created, promoted, and implemented could be revealing research to use in recommending process improvements. To determine the value of postimplementation analysis, a representative sample of IT projects (i.e., sizes, outcome success, cost overruns) could be evaluated for the congruence between estimates and actual results.

A comparative study of other states' processes for assessing, evaluating priorities, and funding major IT projects could also be a useful complementary study. Examinations of alternatives for IT funding mechanisms, management structures, strategic planning, oversight, and experiential repository creation can provide guidance for the state in improving its procedures. Seeking best practices from other states (or federal agencies, counties, or cities) to better address the disparities between the legislative environment

and the agency IT environment would be helpful to improve the State of Minnesota practices.

The participants identified the reputation of the state agency as well as the IT leaders as being important in establishing the level of trust and worthiness of funding, but those reputations are not measured or formally evaluated. Further research into assessing the reputations of individuals and agencies would be useful to the parties in knowing what steps must be taken to improve the trustworthiness and stature of the agencies and individuals.

Studies of the resulting internal process and cultural changes from concerted MIS educational programs in other organizations could provide guidance to the state on determining the appropriate investment in on-the-job educational programs for employees. Measuring proposal quality levels and funding success rates before and after educational programs would demonstrate the worthiness of the educational effort.

Although this study is about a single organization and IT investments, the findings could be tested in other types of organizations for making IT purchasing decisions. Decisions for other types of highly technical purchases in which the decision makers do not have the subject matter expertise from experience or training could be tested too. Decision makers may well be unable to differentiate the nuances of expensive mechanical equipment or specialized facility design, but are still asked to evaluate funding requests.

Summary

The importance of information technology as part of successfully executing the state's mission will continue to grow. Obtaining the necessary IT hardware and software to execute the mission is critical, but dependent on funding. The social significance of assisting the state to obtain the critical IT resources needed lies in improving the ability

of the state to effectively and efficiently deliver much needed services to the citizens and businesses of the state. As tax revenues dwindle, more effective deployment of scarce resources will become increasingly important. Being able to divert more of the tax revenues into direct services, instead of into adding human infrastructure resources, will ensure that the recipients are well-served by the state agencies.

The research findings support the time and effort invested by state agencies in preparing carefully researched, well-crafted, multidimensional, holistically positioned proposals for IT investment. The effort invested improving the proposal documents is repaid in being more likely to obtain the funding needed to execute the project.

The State of Minnesota still has to address critical infrastructure design issues to facilitate successful cross-agency project funding and multiphase projects stretching across legislative biennia. Creating standardized estimation models for soft costs and benefits will result in more realistic, expanded proposal cases. Reaffirming IRM as the IT infrastructure basis, or selecting a new model, will be necessary to create coherent and consistent discussions for evaluating IT proposals within the state. On-going continuing education about IT issues for state employees and legislators will be repaid in improved understanding and communication effectiveness. Drawing on lessons from other organizations' experiences with proposing, reviewing, assessing, and executing IT projects will aid the State of Minnesota in improving its own processes.

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Appendix A

Format for Evaluating the Past Proposals

Overall presentation:

1. Was the proposal word processed and well-edited to make a professional looking presentation?

- o Extremely professional in presentation
- o Very well-prepared
- o Well-prepared
- o Adequately done
- o Poorly presented
- o Not applicable

2. Was the proposal complete in every section? (Note: These sections represent the six Critical Success Factors (CSF) for support of the IRM concept as defined by the IPO.)

- o Section 1: 100% to 80% complete
  60% to 79% complete
  40% to 59% complete
  20% to 39% complete
  0% to 19% complete
- o Section 2: 100% to 80% complete
  60% to 79% complete
  40% to 59% complete
  20% to 39% complete
  0% to 19% complete
- o Section 3: 100% to 80% complete
  60% to 79% complete
  40% to 59% complete
  20% to 39% complete
  0% to 19% complete
- o Section 4: 100% to 80% complete
  60% to 79% complete
  40% to 59% complete
  20% to 39% complete
  0% to 19% complete
- o Section 5: 100% to 80% complete
  60% to 79% complete
  40% to 59% complete
  20% to 39% complete
  0% to 19% complete
- o Section 6: 100% to 80% complete
  60% to 79% complete
  40% to 59% complete
  20% to 39% complete
  0% to 19% complete

3. Was each section well-crafted and carefully presented?
   - o Section 1: 100% to 80% complete well-crafted/presented
     60% to 79% complete well-crafted/presented
     40% to 59% complete well-crafted/presented
     20% to 39% complete well-crafted/presented
     0% to 19% complete well-crafted/presented
   - o Section 2: 100% to 80% complete well-crafted/presented
     60% to 79% complete well-crafted/presented
     40% to 59% complete well-crafted/presented
     20% to 39% complete well-crafted/presented
     0% to 19% complete well-crafted/presented
   - o Section 3: 100% to 80% complete well-crafted/presented
     60% to 79% complete well-crafted/presented
     40% to 59% complete well-crafted/presented
     20% to 39% complete well-crafted/presented
     0% to 19% complete well-crafted/presented
   - o Section 4: 100% to 80% complete well-crafted/presented
     60% to 79% complete well-crafted/presented
     40% to 59% complete well-crafted/presented
     20% to 39% complete well-crafted/presented
     0% to 19% complete well-crafted/presented
   - o Section 5: 100% to 80% complete well-crafted/presented
     60% to 79% complete well-crafted/presented
     40% to 59% complete well-crafted/presented
     20% to 39% complete well-crafted/presented
     0% to 19% complete well-crafted/presented
   - o Section 6: 100% to 80% complete well-crafted/presented
     60% to 79% complete well-crafted/presented
     40% to 59% complete well-crafted/presented
     20% to 39% complete well-crafted/presented
     0% to 19% complete well-crafted/presented

Funding outcomes:

4. What percentage of funding was recommended by the IPO after review?
   - o Greater than 100 %
   - o 100%
   - o 75%
   - o 50%
   - o less than 50%
5. What percentage of the project was funded by the legislature/governor?
   - o greater than 100%
   - o 100 %
   - o 75%
   - o 50%
   - o less than 50%

Proposal positioning:

6.a. Was the project a key part of a larger, longer-term strategic effort for the agency?
- o Yes
- o No

6.b. Was the project necessary to comply with mandatory regulations?
- o Yes
- o No

6.c. Was the project going to support research?
- o Yes
- o No

7. Was the project going to increase the amount of information sharing with other agencies and contribute to the infrastructure of the State?
- o Yes
- o No

8a. Were the soft costs/benefits to IT and the end users cited in the proposal?
- o Yes
- o No

8b. Were they quantified in any way with specific techniques cited?
- o Yes
- o No

9. Were the hard costs/benefits measured for the IT unit and the end users?
- o Yes
- o No

10. Were the benefits to end recipients (citizens and businesses) cited as the primary motivator for the project?
- o Yes
- o No

11. Was the project supporting the state's larger strategy and goals?
- o Yes
- o No

12. Was the project one that had been submitted previously and not funded?
- o Yes
- o No

13. Did the proposal address second order effects on the organization and the people affected by it?
- o Yes
- o No

14. Did the proposal cite the risks involved with the execution and implementation of the project?
- o Yes
- o No

Appendix B

Schema for Interviewing Key Proposal Personnel

Demographics

1. Years in State government service
   - o 0 to 2
   - o 3-5
   - o 6-10
   - o 10 plus
2. Role in the IT proposal process
   - o Preparer
   - o IPO/OT evaluator
   - o House
   - o Senate
   - o Governor's office
   - o Other agency or department
3. Years of experience with IT issues
   - o 0 to 2
   - o 3-5
   - o 6-10
   - o 10 plus
4. Years of involvement with IT proposals in any setting
   - o 0 to 2
   - o 3-5
   - o 6-10
   - o 10 plus
5. IT training venues (check all that apply)
   - o On the job
   - o Vendor/continuing education
   - o Bachelor or Master's in IS/IT
   - o None
6. Education level
   - o High school
   - o Bachelor
   - o Master's
   - o Doctorate/JD/Other post Master's degree

Proposal Content

7. How important is the quality of the written presentation to the success of the funding level?
   - o Very much
   - o Somewhat important
   - o Not important
   - o N/A

8. Which are the three most important factors in the written proposals in the successful funding by the legislature? (Note: The first six items are from the CSFs from the IPO proposal format and the rest are taken from Holmes, 1988; Pollalis & Frieze, 1993; Bacon, 199; Newcomer & Caudle, 1991)

- o Executive leadership and involvement
- o Information management infrastructure
- o Planning
- o High level resource models
- o Organizational structure
- o Effective skills base
- o Reputation of agency and staff
- o Strategic fit of project with state's goals
- o Risk of successful implementation failure
- o Accurate or justified estimates of costs/benefits
- o Identification of second order effects on relationship, power, and organizational structures
- o Justification/testing of assumptions
- o Degree of flexibility in the project plan to adapt to changes

9. Which three factors in the written proposals are least related to success of the funding request?

- o Executive leadership and involvement
- o Information management infrastructure
- o Planning
- o High level resource models
- o Organizational structure
- o Effective skills base
- o Reputation of agency and staff
- o Strategic fit of project with state's goals
- o Risk of successful implementation
- o Accurate or justified estimates of costs/benefits
- o Identification of second order effects on relationship, power, and organizational structures
- o Justification/testing of assumptions
- o Degree of flexibility in the project plan to adapt to changes

10. Are the influence and reputation factors of the agency outside of the written proposal more or less important than the document in successfully obtaining funding?

- o Very important
- o More important
- o Equally important
- o Less important
- o Not important at all

11. What additional aspects of the project should be added to the proposal format?

- o Risk of failure
- o Second level effects on organizational structures and relationships
- o Flexibility to adapt to changes
- o Testing of assumptions of costs/benefit estimates
- o Contribution to fulfillment of agency/state strategy
- o Assessment of probability of successful implementation

12. How are the cost/benefit estimates in the proposal verified after implementation?

- o Verified by state auditors
- o Verified by the agencies
- o Verified by another group
- o Not verified (Should they be? yes or no)

13. How critical is the IPO/OT recommendation in influencing the approval and subsequent funding of the proposal by the legislature?

- o Critical
- o Very important
- o Important
- o Somewhat important
- o Not important

14. How comfortable are you with the proposal's estimates of the soft costs and benefits?

- o Totally comfortable
- o Very comfortable
- o Comfortable
- o Somewhat comfortable
- o Not comfortable at all

15. Should the proposals present multiple funding and corresponding functionality scenarios for consideration (e.g., if funded at 50%, would the resulting functionality be equal 50% or another number)?

- o Yes
- o No

16. How should the issue of risk of project failure be presented in the written proposals?

(open-ended question)

Proposal positioning:

17. Should the proposals include the other related strategic initiatives of the agency to provide a context and a priority?
- o Yes
- o No
- o Not sure

18. How important are projects when they position an agency for future projects that require the proposed project to be in place first?
- o Critical
- o Very important
- o Important
- o Somewhat important
- o Not important
- o Not sure

19. Is the written proposal more or less important than the verbal lobbying for a proposal in successfully obtaining full funding?
- o Critical in obtaining funding
- o More important than the verbal lobbying
- o Equal in importance
- o Less important than the verbal lobbying
- o Not important

20. How much does the reputation of the agency and key IT personnel influence the approval and successful funding of the proposal?
- o Critical in the approval
- o More important
- o Equal in importance
- o Less important
- o Not important

21. Does a good quality written proposal create a higher chance of successful legislative funding for an IT project?
- o Yes
- o No
- o Not sure

22. What are the rewards for the agency and or the proposal preparer for doing an excellent job on the written proposal?
- o Financial (bonuses or successful funding?)
- o Enhanced reputation of agency and individual
- o Increased career promotion possibilities for individual
- o Nothing tangible
- o None

23. What are the punishments for an agency or the proposal preparer for doing a poor job on the written proposal?
   - o Financial (lack of funding or fines)
   - o Degraded reputation of agency or preparer
   - o Decreased career promotion possibilities for individual
   - o Nothing tangible, but perception changes have long-term effects on future evaluations
   - o None

Open Discussion Questions:

24. How would you change the proposal format to provide more relevant or compelling information for the decision makers? What types of extra information would you like to see included?

25. What role do you see the proposal document playing in the eventual successful outcome of the project implementation?

26. What would you change about the review and approval process to make it more effective?

Appendix C

IPO Funding and Proposal Presentation Completeness

Word Processed and Edited?	Funded at 100% requested or more	Funded at less than 100% requested
Extremely to very well-prepared	15	1
Row percentage	94%	6%
Column percentage	54%	20%
Table percentage	46%	3%
Less than well-prepared	13	4
Row percentage	76%	24%
Column percentage	46%	80%
Table percentage	39%	12%

Completeness of Section 1	Funded at 100% requested or more	Funded at less than 100% requested
100-80%	13	0
Row percentage	100%	
Column percentage	38%	
Table percentage	32%	
79%-0%	21	6
Row percentage	78%	22%
Column percentage	62%	100%
Table percentage	52%	15%

Completeness of Section 2	Funded at 100% requested or more	Funded at less than 100% requested
100-80%	13	0
Row percentage	100%	
Column percentage	38%	
Table percentage	33%	
79%-0%	21	6
Row percentage	78%	22%
Column percentage	62%	100%
Table percentage	53%	15%

Completeness of Section 3	Funded at 100% requested or more	Funded at less than 100% requested
100-80%	11	0
Row percentage	100%	
Column percentage	32%	
Table percentage	28%	
79%-0%	23	6
Row percentage	79%	21%
Column percentage	68%	100%
Table percentage	58%	15%

Completeness of Section 4	Funded at 100% requested or more	Funded at less than 100% requested
100-80%	12	0
Row percentage	100%	
Column percentage	35%	
Table percentage	30%	
79%-0%	22	6
Row percentage	79%	21%
Column percentage	65%	100%
Table percentage	55%	15%

Completeness of Section 5	Funded at 100% requested or more	Funded at less than 100% requested
100-80%	11	0
Row percentage	100%	
Column percentage	32%	
Table percentage	28%	
79%-0%	23	6
Row percentage	79%	21%
Column percentage	68%	100%
Table percentage	58%	15%

Completeness of Section 6	Funded at 100% requested or more	Funded at less than 100% requested
100-80%	12	0
Row percentage	100%	
Column percentage	35%	
Table percentage	30%	
79%-0%	22	6
Row percentage	79%	21%
Column percentage	65%	100%
Table percentage	55%	15%

Appendix D

Crafting and Carefulness of Presentation and IPO Funding Levels

Section 1	100% or more of requested funding	Less than 100% of requested funding
80%-100%	11	0
Row percentage	100%	
Column percentage	32%	
Table percentage	28%	
79%-0%	23	6
Row percentage	79%	21%
Column percentage	68%	100%
Table percentage	58%	15%

Section 2	100% or more of requested funding	Less than 100% of requested funding
80%-100%	11	0
Row percentage	100%	
Column percentage	32%	
Table percentage	28%	
79%-0%	23	6
Row percentage	79%	21%
Column percentage	68%	100%
Table percentage	58%	15%

Section 3	100% or more of requested funding	Less than 100% of requested funding
80%-100%	9	0
Row percentage	100%	
Column percentage	28%	
Table percentage	25%	
0-79%	23	4
Row percentage	85%	15%
Column percentage	72%	100%
Table percentage	64%	11%

Section 4	100% or more of requested funding	Less than 100% of requested funding
80%-100%	10	0
Row percentage	100%	
Column percentage	29%	
Table percentage	25%	
79%-0%	24	6
Row percentage	80%	20%
Column percentage	71%	100%
Table percentage	60%	15%

Section 5	100% or more of requested funding	Less than 100% of requested funding
80%-100%	9	0
Row percentage	100%	
Column percentage	27%	
Table percentage	23%	
79%-0%	25	6
Row percentage	81%	19%
Column percentage	74%	100%
Table percentage	63%	15%

Section 6	100% or more of requested funding	Less than 100% of requested funding
80%-100%	11	0
Row percentage	100%	
Column percentage	32%	
Table percentage	28%	
79%-0%	23	6
Row percentage	79%	21%
Column percentage	68%	100%
Table percentage	58%	15%

Appendix E

Completeness of Proposal Sections and Amount of Legislative Funding

Section 1	100% or more of requested funding	Less than 100% of requested funding
100%-80% complete	10	3
Row percentage	77%	23%
Column percentage	56%	14%
Table percentage	25%	8%
79%-0% complete	8	19
Row percentage	30%	70%
Column percentage	44%	86%
Table percentage	20%	48%

Section 2	100% or more of requested funding	Less than 100% of requested funding
100%-80% complete	9	3
Row percentage	75%	25%
Column percentage	50%	14%
Table percentage	23%	8%
79%-0% complete	9	19
Row percentage	32%	68%
Column percentage	50%	86%
Table percentage	23%	48%

Section 3	100% or more of requested funding	Less than 100% of requested funding
100%-80% complete	8	2
Row percentage	80%	20%
Column percentage	44%	9%
Table percentage	20%	5%
79%-0% complete	10	20
Row percentage	33%	67%
Column percentage	56%	91%
Table percentage	25%	50%

Section 4	100% or more of requested funding	Less than 100% of requested funding
100%-80% complete	9	3
Row percentage	75%	25%
Column percentage	50%	14%
Table percentage	23%	8%
79%-0% complete	9	19
Row percentage	32%	68%
Column percentage	50%	86%
Table percentage	23%	48%

Section 5	100% or more of requested funding	Less than 100% of requested funding
100%-80% complete	9	2
Row percentage	82%	18%
Column percentage	50%	9%
Table percentage	23%	5%
79%-0% complete	9	20
Row percentage	31%	69%
Column percentage	50%	91%
Table percentage	23%	50%

Section 6	100% or more of requested funding	Less than 100% of requested funding
100%-80% complete	10	2
Row percentage	83%	17%
Column percentage	56%	9%
Table percentage	25%	5%
79%-0% complete	8	20
Row percentage	29%	71%
Column percentage	44%	91%
Table percentage	20%	50%

Appendix F

Mention of Soft Costs/Benefits and Funding Recommendations

	IPO Funding Recommendation	IPO Funding Recommendation
	100% or more	Less than 100%
Total	34 85%	6 15%
Yes	25 74%	2 34%
No	9 26%	4 67%

	Legislature/Governor Funding Recommendation	Legislature/Governor Funding Recommendation
	100% or more	Less than 100%
Total	18 45%	22 55%
Yes	10 56%	15 68%
No	8 44%	7 32%

Curriculum Vitae

Nancy J. Johnson

Academic Accomplishments

Associate Dean of Business, Capella University. Tenured, Assistant Professor, Management Information Systems, Metropolitan State University. Instructor, Bachelor of Applied Business, University of Minnesota (1994-1999). Adjunct instructor for Carlson School of Business, University of Minnesota (1980-1992). Design and instruction of graduate and undergraduate courses, independent studies/WWW based delivery, and student practicums. Fulbright Scholar, Malaysia, 1992. Fifteen academic conference presentations, 25 professional presentations, editor of book on telecommuting, and a special edition of *Journal of End User Computing*, three book chapters, two journal articles, six columns, and 30 book reviews, reviewer for *Journal of Database Management* and *Annals of MIS Case Studies*, and over 50 professional/community presentations. B.S. and M.B.A., University of Minnesota.

Professional Accomplishments

Commercial Banking, Assistant Vice President: Cash Management Product Management division head, Senior Strategic Planner, BankCard Credit Manager, Commercial Loan Operations Support Staff manager (1981-1990).

Information Systems: Consulting Firm Branch Manager, Senior Consultant, Analyst, Programmer (1969-1981).

Continuing Education and Volunteer Activities

Reviewer of textbooks, journal/conference paper submissions and guest speaker. Active in community and professional boards and as a member of professional MIS and academic associations. Former chair of national software users group and host of two conferences. Supervisor of student projects for nonprofit groups and participant in student associations. Fifteen year alumni volunteer mentor for undergraduate University of Minnesota business students. Participant in Harvard seminar on Teaching with Case Studies, and numerous teaching and technical skill seminars.