Information technology infrastructure stability

Jeffrey Pankow

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Survey of Information Technology Executives

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Information Technology Infrastructure Stability

Jeffrey A. Pankow
Masters of Science Thesis

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Information Technology Infrastructure Stability

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About the Author

Jeffrey A. Pankow

The author completed his studies for a Masters of Science in Information Technology (2001) from the Rochester Institute of Technology, Rochester New York. He also holds a Masters of Business Administration (1990) from the William E. Simon Graduate School of Business Administration at the University of Rochester, Rochester New York. He is currently the Director of Information Technology at NewAlliance Health Plan in Erie Pennsylvania. Prior to that, he was a Manager of Information Technology at BlueCross and BlueShield of the Rochester Area, Rochester New York.

In addition to his studies and career, the author is very fortunate to be married to a beautiful and wonderfully supportive wife – Karen. They have two children, Aidan and Liam, who are now the primary focus in their lives.
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I started my graduate studies at Rochester Institute of Technology (RIT) in nineteen ninety-four and completed my Masters of Information Technology degree in two thousand-one. I would like to thank Steve Jacobs for convincing me to continue my studies at RIT in order to receive my Masters degree in Information Technology. Without Steve’s subtle prodding and common sense arguments, I would stopped taking classes after receiving my Advanced Graduate Certificate in Multi-Media Design from RIT in nineteen ninety-seven.

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1. Abstract

The Information Technology (IT) organization is in a state of great change. One significant aspect of change is in the role that IT performs within the organization. In the past, IT often worked in seclusion, rarely interacting with the organizational staff they supported. The IT infrastructure, the software and hardware that made up the framework in which business processes occurred, was less complicated. Fewer layers of software and hardware existed between the users and the processes they performed. Technology and supporting processes were rigid. The delineation between IT and users they supported was clear. Within this environment, the IT infrastructure was relatively stable.

More recently however, IT has evolved from the organizational back office to the forefront in almost every office and every aspect of organizational functionality. Today, it is rare to find a process in any organization that is not interfacing directly or indirectly with one form or another of IT. A more mobile workforce, global competition, “user friendly” tools, and demanding users, drive the development of a more complicated, and more open IT infrastructure. There are many more layers of hardware and software, differing standards, and larger, more complicated IT infrastructures. These changes increase pressure on the stability of the IT infrastructure.

Today, IT executives are much more involved in the strategic aspects of the organizations they support. This newly expanded role and the rapid state of change create significant challenges for IT. In response to the increased pressures on stability, the IT infrastructure has to evolve in order to maintain stability without stifling necessary change. The stability of the IT infrastructure is defined as the ability of the IT organization to seamlessly support organizational business goals and operations over time. The stability of the IT infrastructure is critical for the organization to achieve its business objectives. IT infrastructure instability is defined as any unplanned or uncontrolled breakdowns in the hardware and software components and/or supporting
processes of the IT organization. An example of IT infrastructure instability would be a customer service system going down during peak calling hours.

The goal of this thesis is to validate the critical importance of IT infrastructure stability and to determine the factors impacting stability and what IT executives are doing to address these factors. To support the goal of this thesis, two surveys of IT executives were conducted. Additional IT data resources sources validate the findings of the surveys.

The first survey established the importance of the IT infrastructure as a major area of focus for IT executives. Respondents indicated that the IT infrastructure has been one of the most significant areas of concern for them over the past five years. They also indicated that there would be increased pressures on the stability of the IT infrastructure in the next five years. The first survey successfully established the importance of the IT infrastructure and equally IT executive concerns over its stability. However, more information was needed to more fully understand the factors impacting IT infrastructure stability and what IT executives are doing to address these issues. These questions led to a second survey of IT executives.

The second survey focused on IT infrastructure stability, the factors impacting stability, and actions that IT executives take to address these factors. Once again, the survey results reaffirm the importance of IT infrastructure stability. Respondents all agree that that IT infrastructure stability is a critical factor in achieving business goals. Most also agree that it is more difficult to maintain stability today than in the past. Factors impacting stability vary, but often include technology changes and the expanding role of technology in the organization. Many IT executives point toward their staff and training as important factors in maintaining stability. In addition to these, standards, policies and procedures and strong vendor relations are also important in maintaining stability in the IT infrastructure.
The surveys validate the assertion that organizations are increasing the pressure on their IT organizations to be more responsive and flexible and that IT infrastructure stability is critical in meeting these demands. Increased competition, shorter product life cycles, global markets, and rising market demands and expectations are often drivers for these pressures. New applications must be delivered faster and existing applications need to be more easily upgraded and integrated. In understanding the importance of their IT infrastructure, IT executives actively pursue actions to maintain stability and control change.

There is agreement among IT executives that IT infrastructure stability is critical to achieve organizational goals and objectives. Most IT executives also agree there has been increased pressure on the stability of the IT infrastructure over the past several years and these pressures will continue to increase in the future. IT leaders work in many different ways to address these pressures and to maintain a stable IT infrastructure. There is no silver bullet to maintaining stability. Despite the variations of approaches to deal with instability, one factor remains certain. A stable IT infrastructure creates the framework in which organizational change can occur. Without this stability, the rapid state of change demanded in today’s competitive environment can result in chaos. This chaos, if severe enough, can ultimately lead to organizational failure.
2. Introduction

"A new fusion of information technology and telecommunications is occurring that will radically affect all companies, whether or not they were significant users of technology in the past."[1] Harvard Business Review – 1993.

The role that Information Technology (IT) performs in today’s business environment has evolved dramatically over the past several decades. The IT organization has become the conduit through which many business functions and processes flow. The development of this role has been occurring over the past several decades and is increasing in velocity. The change has been driven in part by the leadership role IT has taken on, as well as, organizational and market driven forces. In this expanding role, IT can be both a catalyst for change and a support structure to accommodate and foster organizational change. In either case, a stable IT infrastructure is a critical component to allow managed change to occur.

As mentioned, the ability of the IT organization to accommodate organization demands for change is critical. Resisting or inhibiting change can significantly injure an organization’s ability to remain competitive. A Gartner article from 1998 makes the following predictions with regard to the importance of fostering organizational change:

"The competitive landscape of 2003 will be littered with the remains of numerous enterprises that were too slow to seize opportunities and recognize challenges. A new form of enterprise will have emerged, an extremely formidable competitor that continuously scans the environment and its own internal processes to sense important changes. This enterprise will use its knowledge assets to learn from the scanned inputs and will drive innovation of products, services, channels and processes. It will then mutate rapidly to bring innovations to market to seize opportunities and

It is imperative that IT executives not only understand the need for change, but that the stability of the IT infrastructure is critical to providing a framework for change to occur. An unstable IT infrastructure can significantly impact an organization’s ability to manage and implement change. Continued pressure to implement change in an unstable IT infrastructure can lead to IT organizational breakdown and ultimately, chaos. This in turn can impose substantial costs on the organization. These costs and breakdowns can have a snowballing affect; further impacting the organization’s ability to achieve necessary change. If left unchecked, this can eventually lead to organizational failure.

With the magnitude of change occurring in organizational demands being placed on IT, it is inevitable that the IT organization will also need to change. The role that IT serves in support of the organization and the changes required to fill this role are not always clear. A 1998 survey by Gartner indicated that ninety-five percent of IT executives believe that IT is in the midst of significant change. Unfortunately, less than five percent of IT executives feel they have a clear vision of where their organizations are going and how IT will need to change to support them. Despite this lack of clear vision, one requirement remains critical, to maintain a stable IT infrastructure.

An IT organization must recognize the benefit of stability and the role it plays in supporting organizational change. As confirmed in the surveys, the pressures of change that lead organizations to demand more responsiveness and flexibility from IT are increasing. Market demands require faster implementations of leading edge technologies. Existing technologies and applications still need to be maintained and integrated with the new ones. Many IT organizations are faced with the complex task of incorporating newer open system technologies into their legacy applications.

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The stability of the IT infrastructure and the amount of achievable organizational change seem to be related. Changes in an unstable environment can cause a breakdown of core organizational processes. Robert Robless, Vice President of IT at United Airlines e-Commerce division warns, “United Airlines loses $200,000 per hour if our Intranet site goes down.” The positive relationship between achievable change and the stability of the IT infrastructure is critical for organizations, particularly when considering the organization’s increasing demand for change.

Part of the challenge for IT executives is to understand what is driving instability within their IT organization. Despite the importance of stability in supporting organizational change, much of the research regarding the impact of change on IT organizations often does not talk directly about IT infrastructure stability. For example, a Harvard Business School article entitled “Managing in an Information Age: IT Challenges and Opportunities” discusses strategic alignment and levels of maturity, but does not mention IT infrastructure stability. Despite researching dozens of additional articles with similar IT management titles, the topic of IT infrastructure stability remained elusive. To gain insight into the details of stability, the author conducted two surveys of IT executives.

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3. Information Technology Surveys

The majority of information presented in this thesis is based on information obtained from two IT executive surveys. The two surveys of IT executives were conducted in an effort to validate the importance of IT infrastructure stability and to understand more about the factors impacting it and what IT executives are doing to address this issue. The first survey was more general in nature and established the importance of IT infrastructure stability. The second survey focused specifically on IT infrastructure stability, and reaffirmed the importance of stability and provided more insight into the factors impacting stability. The first and second surveys are available for review in the appendix. A comprehensive list of the IT Executives who were included in the survey mailings is also included in the appendix.
a. Survey 1 - Information Technology Executive Questionnaire

The first IT executive survey was mailed in the fall of 1999. The intent of the survey is to gather information about the organization the IT executive is supporting and to establish the importance of IT infrastructure stability. The survey is divided into two parts. Part I questions are designed to gather information about the IT executive, their company and their IT environment. Part II of the survey focuses on the stability of the IT infrastructure. The questions are formatted as a mixture of multiple choice questions and freeform comments.

The IT executive survey mailing list came from CIO Magazine’s top 100 Innovative IT organizations in 1999\(^6\). A few entries on the original list were replaced with IT executives that the author has direct access to for follow-up questioning. The first survey’s response rate is an encouraging 25% and includes several readily recognized IT executives. The respondents include Rick Devenuti -CIO of Microsoft, Stephan Ward -CIO of IBM, Richard Dalzell -CIO of Amazon.com, and James Kinney – CIO of Kraft Foods.

The survey establishes the importance of the IT infrastructure. IT executives reveal that IT infrastructure is a key goal, and a major factor impacting organizational stability. The survey also identifies IT infrastructure stability as a critical component for the organization. Results also reveal key information about the relationship between IT stability and change. A few key factors are:

- Seventy percent of respondents believe that over the past five years it has become increasingly more difficult to maintain a stable IT infrastructure;
- Ninety percent believe pressures on IT infrastructure stability will continue to increase in the future; and
- Eighty percent of respondents indicated that stabilizing IT is one of their primary goals.

Figure 3.a illustrates the responses to question nine of the survey. Question nine asks for a listing of the primary IT goals and whether the goals are completed, not started, or in progress. The free-form responses are accumulated into seven categories. Data warehouse and Client Server goals have the highest rate of “Completion” and electronic commerce has the highest indication of “In Progress”. There are no apparent surprises in the results of the Primary IT goals question. The primary focus appears to be on technology and functionality related issues. Client-Server, Data Warehouse, Electronic Commerce and Enterprise Resource Planning initiatives make up almost seventy-five percent of the goals. Stabilizing IT, strategic alignment and IT excellence make up the remaining goals.

Figure 3.a: Survey 1, Question 9.

![Primary IT goals (non-Y2K related) for IT executives](image)

Question ten starts to reveal interesting facts about how IT executives feel about their IT infrastructure. Question ten asks for information about the future goals of IT executives.
Responses to this question establish the importance of the IT infrastructure (see Figure 3.b). Goals such as “Strategic Architecture”, “highly scalable – adaptive systems”, “video to desktop”, and “network redesign” are included in what the author defines as components of the IT infrastructure. They all include some aspect of information technology development, deployment, or integration in support of organizational goals and objectives. Consolidating these responses indicates that IT infrastructure goals will consume one-third of the IT organization’s time in the next several years.

Electronic commerce, which includes “business to business”, “web development”, and “business to consumer” accounts for the next largest response with twenty-eight percent of IT executives indicating that they will be focusing on these issues. Electronic commerce and web development could also arguably be included in IT infrastructure initiatives indicating an even larger focus on infrastructure. Responses also indicate that globalization will continue to be a consideration for IT executives directly impacted by global market demands and trends. Enterprise Resource Planning (ERP) implementations will also remain an area of focus over the next couple of years. Organizational consolidation, IT organizational funding, and business process excellence round out the remaining elements on the chart, but at comparatively lower levels.

Figure 3.b: Survey 1, Question 10.
The next series of charts explores the topic of IT infrastructure stability. Question fourteen asks for information about what pressures impacted stability during the past five years (see Figure 3.c). The responses to this question establish the importance of IT infrastructure stability. The majority of issues to impact IT stability in the past five years are the IT Infrastructure – the systems and technology employed by the organization. Market demands come in a very distant second, and staffing and electronic commerce, which may be rolled into either market demands or infrastructure, rounds out the list. It is interesting that IT executives consider changes in technology as a primary driver behind increased difficulty in maintaining stability in their organizations. Could there be a link between efforts to maintain a stable IT infrastructure while simultaneously increasing the complexity of the environment causing unintentional instability? Results from the author’s second survey seem to support this assertion.

Figure 3.c: Survey 1, Question 14.

![Factors impacting IT stability in the past 5 years](chart.png)
The last question in the survey, question fifteen, asks IT executives to discuss future stability pressures. Figure 3.d, illustrates what IT Executives believe will be the future impacts to IT stability. Once again, the IT infrastructure accounts for the most significant element of the future stability issue, making up forty percent of the chart. Market Demands and Electronic Commerce make up another forty percent of the responses. Despite the significance of these other two factors, IT infrastructure concerns dominate the IT executive’s focus in the future.

Figure 3.d: Survey 1, Question 15.

Question twelve asks for information regarding outsourcing and the existence of multiple locations. IT executives are asked if these factors impact their ability to deliver a stable IT infrastructure. Most of the survey respondents indicate that they have multiple IT locations and outsource some portion of their IT functions. The most prevalent outsourced functions are Help Desk and some level of Desktop support. However, respondents indicated that neither multiple IT locations nor outsourcing of IT functions have any major impact on the stability of their IT organization.

Responses to this first survey establish that the IT infrastructure is a major area of focus for IT executives. Additionally, IT infrastructure stability will be a critical focus for IT executives in the future. Unfortunately, the first survey does not reveal much
detail about why the IT infrastructure is so important. It also does not reveal much about
the sources of the instability pressures. Nor does it uncover much detail about what IT
executives are doing to address instability. To gain further insight into these topics, a
second survey was conducted that focuses more exclusively on instability factors and
what is being done to address them.
b. Survey 2 - Information Technology Infrastructure Stability Questionnaire

The first survey established the importance of infrastructure stability and the increased pressure on that stability. However, to more fully understand the factors impacting stability and what IT executives are doing to address these factors, the second survey is more focused on these topics. The survey is composed of seven multiple choice and freeform text questions. The goal of the survey is to confirm the importance of a stable IT infrastructure in meeting the business goals of the organization and to determine what factors are impacting stability and what IT executives are doing to address these factors.

The second survey was conducted in the fall of 2000 to over one hundred and fifty IT executives. The list of IT executives is drawn from CIO Magazine’s Top 500 IT organizations. The response rate to the second survey is not as impressive as the first. There is an estimated response rate under seven percent. Perhaps the lower response rate is partially due to the more difficult nature of questions in the second survey as compared to the first. Several of the more recognizable respondents and companies include Bud Fiume, CTO of Nabisco, David Thompson from PeopleSoft, Dick LeFave from Nextel, and Diane Drum from DuPont.

The response to the first question, which asks about the importance of a stable IT infrastructure, confirms again that IT infrastructure stability is critical. Response to the third question which asks if it is more difficult to maintain stability today than in the past quickly confirms that it is indeed increasingly more difficult to maintain stability. Responses to questions one through four reveal the following:

- Ninety percent of respondents agree that IT infrastructure stability is critical to achieving business goals;
- Sixty percent indicate that organizational change impacts the stability of their IT infrastructure;
• Eighty percent agree that it is more difficult to maintain a stable IT infrastructure today than in the past;
• Sixty percent also agree that it will be more difficult in the future to maintain a stable IT infrastructure.

There is over-whelming agreement that a stable IT infrastructure is critical for achieving business goals. A few of the respondents provide additional comments to their answers. Figure 3.e below illustrates these responses. System availability is identified as the most important factor, followed by organizational dependency on IT, and lastly, system scalability. Organizational dependency on IT and system availability are very closely linked to one another.

Figure 3.e: Survey 2, Question 1.

Why IT infrastructure stability is critical for achieving business goals

Scalability
13%

Dependency on IT
25%

24x7x365
62%
The second question asked about the impacts that organization change has on the stability of the IT infrastructure. Sixty percent of the respondents agree there is an impact (see figure 3.f). The most significant impacts are on strategic alignment—understanding the needs of the operational areas and making sure they are being addressed, and increased complexity—adding additional layers of technology in response to increased organizational demands. Increased complexity included Web development, a more mobile work force, and new technologies that need to be linked with existing applications. This gives some insight into the almost spiraling effect that organizational demands for change, leading to increased complexities, has on efforts to maintain stability.

Figure 3.f: Survey 2, Question 2.
Even though most IT executives agree that organizational changes impact stability, forty percent of IT executives responded that organizational changes have no impact on their ability to maintain stability. The reasons given are split evenly between retaining qualified staff, good management practices, and the adaptability of the IT infrastructure to changes (figure 3.g). [Not surprisingly, retention of qualified staff and management capabilities will surface again later as factors IT executives agree that help maintain stability.] The forty percent who responded that stability is not impacted by organizational change may have already identified remedies to these issues and successfully employed them to maintain stability.

Figure 3.g: Survey 2, Question 2.
Question three asks if it is more difficult to maintain a stable IT infrastructure today than in the past. Eighty percent agreed that it is more difficult (see figure 3.h below). Of those, sixty percent indicated that it is more difficult due to the increased complexity of the IT infrastructure. There are more layers of software and hardware that need to communicate together, making the overall architecture much more complex and difficult to maintain. The remaining reasons are split between increased expectations, poor tools, and increased dependency on IT. The increased expectations and increased dependency on IT again speak to the increased role that IT plays in organizations today. This increased role is driving demand for more and improved functionality from IT, and at the same time raising the levels of expectation and demand from the organizational operations areas.

Figure 3.h: Survey 2, Question 3.

![Pie chart showing reasons why it is more difficult to maintain stability.]

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Increased Expectations</td>
<td>13%</td>
</tr>
<tr>
<td>Poor Tools</td>
<td>13%</td>
</tr>
<tr>
<td>IT Dependency</td>
<td>12%</td>
</tr>
<tr>
<td>More Complex</td>
<td>62%</td>
</tr>
</tbody>
</table>

Twenty percent of respondents say it is less difficult today to maintain stability. However, only one respondent gave reasons on why they believe it is less difficult. They indicated that the increased complexities (they did acknowledge that it is more complex today) are offset by increased capabilities. Once again, perhaps they have developed sound management practices, retained qualified staff, and have a flexible architecture in place to maintain stability.
The fourth question asks IT executives if it will be more difficult in the future to maintain stability (see figure 3.j below). The majority agree (sixty percent) that they believe it will continue to grow more difficult in the future to maintain stability. The reasons given are in line with the reasons identified as making it difficult to maintain stability today. Increased complexity and increased customer expectations account for almost eighty percent of the reasons. Most IT executives agree that maintaining IT infrastructure stability will continue to be more difficult in the future and that the driving factors are similar to what they are experiencing today.

Figure 3.j: Survey 2, Question 4.
A smaller percentage of respondents, forty percent, believed it would not be as difficult in the future to maintain stability than it is currently. This group is much more optimistic about future capabilities to deal with stability (see figure 3.i). Many feel that better technology will be developed to help address and maintain stability. They also look to better management and training. Some even believe that the number of layers of technology will be decreased through consolidation – helping address stability.

Figure 3.i: Survey 2, Question 4.

Why it will be less difficult to maintain stability in the future

- Management: 25%
- Better Technology: 37%
- Training: 25%
- Platform Consolidation: 13%
Question five asks respondents to identify the most significant factors impacting stability (see figure 3.k). Not surprisingly, increased complexities and increased customer expectations account for the majority of responses. This is consistent with the premise that the IT infrastructure continues to grow more complex (increased complexities), and that IT continues to move into almost every aspect of organizational processes (increased customer expectations). Staff training and retention of qualified staff make up thirty percent of the factors and lack of standards round out the remainder of factors.

Figure 3.k: Survey 2, Question 5.

The most significant factors impacting stability

- Increased complexities: 39%
- Retention: 15%
- Increase expectations: 23%
- Lack of Standards: 8%
- Training: 15%
The sixth question asks about the factors that IT executives use to maintain IT infrastructure stability. As might be expected, there is no single answer - no silver bullet, to address IT infrastructure stability (see figure 3.1). No answer to question six accounts for more than fifteen percent. There are eleven different factors identified. The two most common responses are staying current with software and hardware, and having a system architecture design that will support change. Interestingly, staying current with software and hardware will in and of itself require change, with the expectation that the change will help maintain stability. The next most important consideration is to have an architectural design that will support organizational change while maintaining a stable IT infrastructure. The next five factors all weigh in equally in importance; Service Level Agreements and metrics, change control, management, retention, and training. These represent a mixture of having qualified staff and management, and policies and procedures and measurement tools to monitor and maintain stability. The remaining three factors are a combination of technology and strategy; strategic alignment with organizational goals and objectives, maintaining and using standards in technology and development processes, and having the right technology tools.

Figure 3.1: Survey 2, Question 6.
The variety of responses to how IT executives maintain stability in their IT infrastructure gives insight into the complexities involved in this effort. Question seven, the final question, asks respondents to identify any other considerations for IT infrastructure stability. Many of the responses are similar to issues identified in earlier questions. They include flexibility and scalability of infrastructure architectural design and using benchmarks (metrics) to help maintain focus. Vendor relations and outsourcing are also identified as options. [Several executives indicate that corporate communication is important and that stability can compete against other IT and organizational priorities leaving it vulnerable as a primary focus for IT.] Buddy Fiume, the Chief Technology Officer of Nabisco, noted “Stability is inversely related to complexity..focus should be on a comprehensive, but simple infrastructure.”

7 Information Technology Executive Questionnaire, Jeffrey A. Pankow, 2000. Buddy Fiume, CTO of Nabisco, response to survey question seven.
c. Other Survey results

It is difficult to find surveys focusing directly on IT infrastructure stability. Many of the IT surveys researched do not directly discuss IT infrastructure stability. However, a yearly survey conducted by Gartner can be used to make an interesting comparison to the thesis survey results. The Gartner survey, first conducted in 1995, identifies the top five technology issues and the top five management issues for CIOs. Gartner indicates that they believe that technology issues are relatively volatile while management issues remain relatively stable over time. This supports the idea that technology is continually changing making it difficult for IT executives to keep focused on any one issue long enough to optimize it.

Since 1997, Gartner has found that only one issue, network management, remains on the technology list year after year. The Internet and packaged solutions, two of 1997's top technology challenges, appear for the first time in 1997. And four of 1995's "hot topics" - client/server architecture, electronic commerce, application development tools and object-oriented technology - do not make the 1997 list. However, one could readily roll these technology issues (i.e. network management, Internet, client/server) into the broader category of IT Infrastructure, thus supporting the findings in the author's surveys that IT infrastructure continues to be a primary focus of IT executives.
4. Change and Instability

"If the 1980s were about quality and the 1990s were about reengineering, then the 2000s will be about velocity. About how quickly the nature of business will change."*  

Bill Gate's comment above is readily confirmed by the author's surveys. IT executive responses to the two surveys conducted by the author confirm that the IT environment is changing more rapidly today than in the past. IT organizations will be subject to continuous organizational and technological change at an increasing rate in the future. The author's surveys also reveal that it is critical for IT executives to maintain a stable IT infrastructure despite the rapid changes. The growing importance of IT in almost every aspect of organizational processes as confirmed in the surveys is supported in a white paper from the Keane consulting group. The white paper is entitled "Outsourcing As A Means Of Improving..." (Keane, 1997) supports the rapid state of change by pointing out the following:

"The scale and complexity of business software applications have increased dramatically since the introduction of computers. Today, few, if any, significant business processes operate without some form of software support, and a typical corporate portfolio now includes a range of platforms, operating environments and languages. Moreover, the proliferation of business applications and their complexity shows no signs of abating. (p. 1)"  

In some cases, the market demands innovation and shorter time to market. In other cases, technological change drives market innovation. Business units are anxious to use the latest technology to reduce time to market, increase productivity and improve

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customer satisfaction and service. However, many of these changes have been costly. Not just from a budgetary standpoint, but from a relative stability standpoint.

The author’s survey results indicate that over ninety percent of respondents believe that in the next five years there will be increased pressure on the stability of IT organizations. These increased pressures are the result of a combination of things including changes in technology, business and market demands. A similar finding from Gartner offers some insights on the nature of the infrastructure changes. Gartner (1998) estimates that in the two-year period between 1998 and 2000, organizations will be subjected to numerous technology changes including:

- At least one new operating system;
- New personal productivity tools and upgrades;
- New e-mail system;
- New applications;
- New graphical user interfaces (GUIs);
- New support structures;
- Greater responsibility for application development (InSide GartnerGroup 1998).

Increasingly complex software drives the need for increasingly complex hardware to support the growing demands for functionality, connectivity, and bandwidth. This is confirmed by many of the IT executive comments in the surveys. The impact of all these technological changes on an organization can be profound. In an interview with CIO Magazine, the former CIO of Xerox Corporation, Patricia Wallington, stated “.The productivity and the gains that American corporations have made couldn’t have happened without the information technology that’s been put in place.”

Organizations that do not recognize the importance of IT and its strategic impact may not be able to compete in the marketplace of the future. In the past ten years, worker

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productivity has increased dramatically through the implementation of technology.\textsuperscript{12} Organizations that do not take advantage of opportunities to dramatically increase productivity will not remain competitive. In further support of this, according to Schlier and McNee (1998), "[The successful] enterprise will use its knowledge assets to..Innovate products, services, channels and processes." They go on to say, "This enterprise will be enabled by information, knowledge and technology."

The survey findings with regard to questions about the drivers of instability can be readily organized into two major categories. The first is increased organizational expectations of IT. Increased expectation includes increased reliability on IT for core organizational processes. The second is increased IT complexities. There is a combination of increasingly complex software and hardware and increased layers of technology making the entire environment more difficult to maintain stability. In part, the increased complexities are due to a marked increase in the use of technology by non-IT staff. Additionally, there is much greater demand for remote connectivity and greater demand for access to external networks such as the World Wide Web.

The current elements of instability may change over time depending on many factors that can impact the environment. For example, competition, technological change (i.e. introduction and subsequent growth of the Internet) market demands, and resource availability may impact and even change the major forces of change impacting IT. The IT organization will develop new stabilizing forces to address these new forces of change.

One of the key issues identified by most IT executives as both a factor for instability and a key area of focus is staff retention. Turnover is a growing concern for many IT organizations. A Computerworld survey (1998) indicated that fifty-seven percent of IS managers fear losing staff to recruiters and placement agencies. Excellus Health Plan, Inc. (Doing Business As: BlueCross & BlueShield of the Rochester Area) a health insurance company operating in Rochester, New York, experienced the impact of

significant IT turnover in 1998.¹³ Excellus Health Plan's IT turnover rate went from below five percent for the prior three years to over twenty percent in 1998. The magnitude of this change had significant impacts on the Excellus Health Plan organization. The organization had not previously experienced such dramatic change of this magnitude. Significant impacts included the loss of key IT business and application knowledge that impacted productivity. Additionally, the Human Resource department was unable to react quickly to put changes in place to stem the staff turnover. Nor were they prepared to help IT fill the open positions in a timely fashion, further damaging productivity.

The IT turnover rate continued to be over twenty percent in 1999 until several changes were implemented including significant compensation changes. Other changes included new IT staff surveys to help management determine causes for dissatisfaction. The corporate culture at Excellus Health Plan, Inc. also changed, to position it more aptly to meet the needs of its IT staff.

Many organizations were hit with retention issues during the late nineteen-nineties due to Y2K resource pressures. However, Y2K related staffing pressures are over. Yet the demand for IT personnel remains very high. Conservative estimates reveal that there are still over three hundred thousand vacant IT positions.¹⁴ Market indicators estimate that demand for IT personnel will continue to exceed supply for the foreseeable future. A recent report indicated that fifty percent of surveyed companies still believe that employee retention is a growing problem with their organization.¹⁵

To counter this fear, many companies, like Excellus Health Plan, Inc., are trying various approaches to retain staff. Some are employing fairly routine “retention getters”. For example, mentoring programs, expanded career ladders, more competitive

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¹³ The author worked as an IT Manager at Excellus Health Plan, Inc. from 1990 to 2000.


¹⁵ “Thomas Staffing 14th Annual Survey Results” Thomas Staffing, 1 January 2000.
compensation offerings, and increased training. However, two decades of corporate downsizing have proven that employers are less loyal and employees are well aware of this fact. Therefore, some employers are striving to be a bit more innovative in the retention battle. For example, some companies are offering on-site day care, exercise facilities, greater staff input in company policies and strategies, and greater flexibility in defining their own role within the company.

There are other work force factors that may impact stability. Often in the past, programmers and IT professionals may have been characterized as “peculiar” sorts of individuals. They tended to live behind secured doors, and seldom met with non-IT staff. However, as mentioned earlier, this is changing. Along with other changes in technology, the perception of the IT professional is changing too. Today, programmers and other IT professions are becoming increasingly active in the daily lives of company’s operational areas. Increasingly, the IT staff is asked to make business decisions and/or recommendations based on system, technology, and business acumen. This can create difficult situations for staff not used to these new levels of interaction. In an article from Gartner (1998), the transition is described as follows:

“Perhaps the most challenging issue is the conversion and cultural alignment of the IS organization with business objectives. This is not the more generic “business and IT goals” alignment issue, but rather a necessary change in the attitude of IS personnel from one that is technical to one that is more business-oriented. Too few IS professionals have a customer-driven mentality, nor do they appreciate that the quality and responsiveness of the services they deliver to business units and IT end-users are as important to success as technical proficiency.”

As mentioned earlier, CIOs are increasingly being asked to play more strategic roles in the direction of companies. Also, technology is becoming increasingly user-friendly, allowing more users to understand and interface more directly with the technology around them. Non-IT operational staffs are now performing more functions that were traditionally IT functions. These non-IT operational staffs untrained in

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Figure IV.a helps illustrates this change in roles and functionality. The illustration on the right depicts a small gray area between data processing and end-user. This is representative of how rigid the functionality differences between the two once were. The illustration on the left shows a much broader band of gray. This broad gray area is indicative of the environment that exists today. Whereby, end-users have much more flexibility in functionality that once is traditionally considered the exclusive realm of IT. For example, desktop productivity tools like Microsoft Office and Lotus Notes provide end-users with functional capabilities to set up their databases and workflow applications.

Figure 4.b: The overlap between IT and the End-user continues to grow.

<table>
<thead>
<tr>
<th>1950s to early 1990s</th>
<th>mid 1990s to Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-User Functionality</td>
<td>End-User Functionality</td>
</tr>
<tr>
<td><strong>Functionality Overlap</strong></td>
<td><strong>Functionality Overlap</strong></td>
</tr>
<tr>
<td>Data Processing Functionality</td>
<td>Information Technology Functionality</td>
</tr>
</tbody>
</table>

Changes in the workforce will continue to occur and will continue to present IT executives with the challenge of incorporating the changes while maintaining stability. This will require the IT organization to monitor and understand the level of technological expertise and usage that exists within the organization it supports. In addition, the IT organization will need to understand it’s own changing dynamics. The closer IT executives are to IT and organizational staff, the more likely they are to understand their needs. This will help avert unanticipated changes from disrupting the stability of the environment.
5. Managing Stability in a State of Change

"As we enter the twenty-first century, we are seeing a breakdown of the traditionally stable functional hierarchy and its associated management principles" – Richard L. Nolan and Katherine N. Seger. (1993)

Revolutionary changes in Information Technology continue to drive the transition from the Industrial Age to the Information Age. The potential for productivity gains as a result of these new technologies is almost unprecedented. Amid such a high degree of change, it is a constant challenge for IT to keep daily operations stable while implementing new processes and functions. This is the challenge of managing change while maintaining stability. Dick LeFave, Senior Vice President and Chief Information Officer of Nextel Communications gives sound advice on managing IT in an environment of change. Dick comments, “Good tools and a solid business basis for IT are critical. A good shop is based on sound reporting and tracking fundamentals. I focus my managers on running the IT operation like their own business. I would say IT needs to provide a platform for innovation and it should not just support the business but also stimulate the business processes.”

Many organizations are coming to expect a top-quality infrastructure as part of doing business. The author’s second IT executive survey affirmed the increased expectations organizations on their IT departments. Thirty-eight percent of IT executives believe the future will yield increased expectations for their IT infrastructure leading to increased pressures on stability. Expectations have developed over time that PCs and networks will provide the same levels of availability as the mainframe-based applications have provided for years. This is not an easy task as technology continues to develop at very rapid rates and applications continue to grow in complexity.


End users continue to gain greater access to technology, sometimes leading to more problems than it solves. For example, end users at Sun Microsystems expect a top-quality infrastructure, but IT must make them willing to pay for it. The way Sun Microsystems Inc. CIO William J. Raduchel sees it; it's tough for IT to win when it comes to infrastructure. First, managers strive to deliver the latest technology at the lowest cost to technology-hungry users. Then they must convince those users that they're getting their money's worth from the system. "The hard problem is [having] a network that works well [but] is perceived by some [users] as too expensive, even though they often are the major drivers of those costs," Raduchel says.19

Today, there needs to be a balance between operational stability, business innovation, and technological change. Imbalance can develop into organizational "emergencies" or instability. The IT organization is then put on the spot to step in and restore stability. Imbalances can occur as a result of competition, changes in industry technology, or changing market conditions. Edward Galgay, CIO of Polo Ralph Lauren, has identified the following five ways to monitor the balance between business and technology:20

- **Vision** -- IT must help build a strategic consensus in the organization, which will in turn help drive the direction of the organization.
- **Business partnership** -- IT must not only be a full partner in the process of innovation, but it must lead in educating all partners to the economic benefits of technology.
- **Architecture** -- IT leadership must design and lead in the integration of technology components, lead in the migration of one set of technologies to the next generation, and minimize the risk of

19 Mayor, Tracy. "Can you upgrade your infrastructure without affecting your company's productivity? USAA answers its own $105 million question." CIO Magazine, 1 August 1997.

deployment approaches, deciding if it is appropriate to go forward with a Big Bang or incremental rollout.

- **IT funding model** -- utility and innovation are the two drivers for funding. For the former, limit costs while keeping the lights on; for the latter, strategic initiatives must be considered in terms of business benefits.
- **Organizational model** -- utility initiatives must be funded separately from innovation initiatives, and should never compete for dollars. Both however MUST be aligned with the corporate vision.

Strategic decisions cannot be made in a vacuum within IT. They need to be made with full organizational support. Using the five utility levels described above by Edward Galgay can help defuse emotional arguments before they happen, and keep crises manageable (i.e. minimize the amount of instability). Ken Thompson, the Chief Information Officer at PeopleSoft, warned, “Stability is often a conscious (or unconscious) choice that competes with other IT/business priorities.”

Maintaining a stable IT infrastructure can be a daunting task. The author’s surveys confirm there is no single answer - no silver bullet, to address IT infrastructure stability. The corporate culture of most companies must continue to change as they recognize and exploit the strategic importance of their IT organization. In the mid nineteen nineties, senior management at a growing company heavily reliant on IT for their core business, responded to IT staff increased workload concerns with, “...working here [and being unhappy] is better than the alternative [not working at all].” This type of corporate philosophy changed as key IT staff started leaving the company in search of companies with corporate philosophies more in-line with their own. IT executives agree that retaining qualified staff is one of the highest priorities for maintaining stability.

Some innovative companies are modifying their corporate cultures to reflect the increasing importance of IT and changing IT staff requirements. They are willing to focus more on the needs and issues that IT staff feel are important, all in an effort to retain the best employees. IT executives need to balance their desire for innovation and

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technological interest, with a general manager-like quality of business pragmatism. This corporate alignment of goals allows the IT organization to experience change from a business rather than a technical perspective. In order to mitigate the risk of unexpected change, IT organizations must constantly work to align their strategic plans with the strategic plans of the company. This will help ensure that as the market and business drivers change, IT can react appropriately to those changes.

It is also important to maintain an architectural design made up of components that are readily supportable and meet the functional demands of the organization. IT executives confirmed that the two most common factors in maintaining stability are staying current with software and hardware, and having a system architecture design that will support change. It is also important to manage the IT resources well. Sound management includes; establishing and maintaining Service Level Agreements, using metrics to measure performance against peer groups, and change control to monitor rate of change introduced into the organization.

Today, organizations have a greater appreciation coupled with higher expectations for the IT organization. They expect IT to understand their business requirements and partner with them in fulfilling these change requirements. IT staff can take heart by recalling that the most successful “carpet baggers,” roaming the South at end of the Civil War were able to whistle Dixie or the sing the Battle Hymn of the Republic with equal enthusiasm depending on the company at hand. So too, in order to be equally successful, today’s IT organization needs to be able to accommodate increasing organizational demands for change, while simultaneously maintaining a stable IT infrastructure to accommodate those changes – each with equal enthusiasm.
6. Conclusions

"Nothing exemplifies how fast the Internet is changing things more than two facts. It took 38 years for 50 million U.S. users to get radio. It’s taken four years for 50 million U.S. users to get on the Web." CIO Magazine

The next millennium continues to usher in the transition from the Industrial Age to the Information Age. This transition has many similarities to another very significant change that occurred a century ago. That is the transition from an agricultural economy to an industrial economy, referred to as the “Industrial Revolution.” Just as the advent of the steam engine and steel brought about the Industrial Revolution, so too are the computer and software bringing about a shift from the industrial age to information age.

This transition has created a new player in an arena where industrial age critical success factors of labor and materials formerly ruled –namely information. Information, and the strategic use of it, has created an incredibly powerful new asset for organizations. Information has become a particularly important factor in the development of strategic visions and plans. The information technology infrastructure is the framework within which information is housed.

The role IT plays in business continues to grow in importance to the point where most organizations can’t function without IT support. Buddy Fiume, Chief Technology Officer with Nabisco, points out that, “Virtually all business operation in a Fortune 100 company literally depends on IT. When systems are down, key business processes stop. This is much more the case now than it was a few years ago.” Organizations that fail to recognize and exploit the power of their IT division will not survive. Likewise, IT

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organizations that fail to change as their world changes around them, will drive their own organizations to failure.

One of the major assertions of the thesis is that the stability of the IT infrastructure is critical for organizational success. Responses to the surveys overwhelmingly support this. When stable, it provides fertile ground for innovation and change. Within a stable IT infrastructure, IT executives can act quickly to change focus in support of the next big corporate issue, need, or demand. The future of the information technology field is going to continue to be filled with change and pressures on stability. Unfortunately, there is no silver-bullet for addressing IT infrastructure stability. It takes a concerted effort by management, staff, vendors, and technology to create an architecture that will stand up against the increasing pressures of change.

To get it wrong, to end up with an IT infrastructure that does not stand up against the increasing pressures of change, can mean the ultimate failure of the organization. To get it right, to create a stable infrastructure in which change can be fostered and managed, will help the organization achieve prosperity and success. For future studies, there may be an opportunity to research the organizations that have failed, or have been taken over by other organizations, to determine if IT infrastructure instability played any role in the failure.

In retrospect, the surveys served as an excellent tool to gather information directly from IT executives. The lack of readily available information on IT infrastructure stability seems to indicate that this topic offers significant untapped potential for future research. Future surveys could use the data gathered by these first two surveys to take the study of IT infrastructure stability to an even greater level of detail. For example, the first two surveys revealed that future impacts on IT infrastructure stability include increased complexities, increased organizational expectations, and retention. Future surveys could focus on these three topics and ask for specific examples for each factor.
One of the most time consuming aspects of conducting the surveys was gathering the mailing addresses of the IT executives. Once an IT executive’s name was identified through CIO Magazine, the executives’ company website was located, then any Securities And Exchange (SEC) filings were researched (Usually found in the Investors Relations section). The company’s mailing address is one of the required fields for SEC filings. This is a very slow and tedious process. A suggestion for future surveys would be to research the option of purchasing mailing lists for IT executives.

It might also be interesting to see how the responses to the same IT infrastructure stability survey might change over time. The two surveys conducted for this thesis, unintentionally crossed over the millennium change (1999-2000). Interestingly, responses to the first survey’s (1999) questions about causes for IT infrastructure stability barely mentioned staff training or retention. However, the second survey (2000) conducted a year after the first, revealed retention and training as among the highest causes of IT infrastructure instability.

IT executive surveys are an excellent method to gain insight on the thoughts and experiences of senior IT executives. The topic of IT infrastructure stability still remains relatively unexplored and offers a great deal of potential for future exploration. For example, an annual survey of IT infrastructure stability might reveal interesting trends in IT organizations, their management, and their relationship with the organizations they support. It would be exciting to see the results of further studies into the topic of Information Technology infrastructure stability.
Dear Information Technology Executive:

I am a graduate student at Rochester Institute of Technology and am completing my requirements for a Masters of Science in Information Technology. I have chosen for my capstone project a thesis focusing on the importance of a stable Information Technology infrastructure. Part of my thesis requires surveying Information Technology professions to gather information on their experiences and perspectives.

To that end, I would greatly appreciate your help by completing the attached survey. Please feel free to make comments where applicable. The survey is a self-mailer with postage already included. When you have completed the survey, please fold it in half with my return address visible on the outside, tape the middle together and drop in the mail.

If you have any questions or comments, please feel free to give me a call at 716.238.4642 (W) or 716.538.4744 (H). Or you can e-mail me at Jeffrey.Pankow@Excellus.com. Again, your time in answering the attached questionnaire is greatly appreciated.

Sincerely,

Jeffrey Pankow
Please take a moment to complete the following survey. When you have completed the survey, fold it in half with my return address visible on the outside, tape the middle together and drop in the mail.

A. About yourself

1. What is your title?
   - CIO
   - VP Information Technology
   - CTO
   - Director/Manager
   - Other:

2. How long have you been in your current position?
   - < 6 months
   - 6-12 months
   - 1-2 years
   - 2-5 years
   - > 5 years

3. How long have you been in IT?
   - < 5 year
   - 5-10 years
   - > 10 years

B. Your Company

4. Company's estimated gross revenue (in $Millions)?
   - < $50
   - $51-500
   - $501-1,000
   - $1,000-10,000
   - >$10,000

5 Number of employees?
   - < 50
   - 51-250
   - 251-1,000
   - 1,001 – 10,000
   - >10,000

6 Number of IT Staff?
   - < 25
   - 26-100
   - 101-500
   - 501-1,000
   - >1,000

7 What is the primary function of your company?
   - Manufacturing
   - Services
   - a. Please specify: ___________________________

C. Your IT Environment

8. How do you measure the success of your IT organization/projects?
   - Service Level Agreements
   - Cost Benefit Analysis
   - Return on Investment
   - Customer Satisfaction
   - Total Cost of ownership
   - Other:

9. Which of the following are/were primary IT goals for you? Have you achieved them? Check each box that applies.
   - E-commerce
   - Stabilize IT
   - ERP implementation
   - Data Warehouse
   - Client-Server
   - Other:

10. What do you plan on focusing on in the next 1-2 years?

   a. 3-5 years?

   __________________________
   __________________________
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   __________________________
D. Stability of IT Infrastructure

Given that the following definition applies: Stability of the Information Technology infrastructure is “The ability of the Information Technology organization (hardware, software, staff, and related units) to seamlessly support business goals and operations over time.” Please answer the following questions:

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Notes</th>
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<tbody>
<tr>
<td>11. Is your IT organization divided into multiple departments or divisions?</td>
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<td>- No</td>
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<td>- Yes</td>
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<td>a. If Yes, please indicate the major divisions or departments:</td>
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<td>12. Do you have multiple IT locations?</td>
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<td>a. If Yes, what impact do multiple locations have on the stability of your IT organization?</td>
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<td>13. Do you outsource any IT functions?</td>
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<td>- Yes</td>
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<tr>
<td>a. If Yes, what functions do you outsource and how has outsourcing affected the stability your IT organization?</td>
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<td>14. Do you believe over the past 5 years it has become increasingly more difficult to maintain a stable IT infrastructure?</td>
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<td>- Yes</td>
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<tr>
<td>a. If Yes, what do you attribute this to and what steps have you taken to address?</td>
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<td>15. Do you believe there will be increased pressures on the stability of your IT infrastructure in the next 5 years?</td>
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<td>- No</td>
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<td>- Yes</td>
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<tr>
<td>a. If Yes, what are they and how do you plan to address them?</td>
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<tr>
<td>E. Personal Data (Optional)</td>
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<td>16. Name:</td>
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<td>E-mail:</td>
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<td>Phone:</td>
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<tr>
<td>Fax:</td>
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</tr>
<tr>
<td>16. Would you like access information about my Thesis once it is complete?</td>
<td></td>
<td></td>
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<tr>
<td>- Yes</td>
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<tr>
<td>- No</td>
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</tbody>
</table>

THANK YOU!
### Appendix B: Mailing list for Survey 1

Respondents are in **BOLD**.

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>CORPORATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>David P. Drew</td>
<td>VP of IT</td>
<td>3M</td>
</tr>
<tr>
<td>Larry E. Kittelberger</td>
<td>Senior VP and CIO</td>
<td>AlliedSignal Inc.</td>
</tr>
<tr>
<td>Richard L. Dalzell</td>
<td>VP and CIO</td>
<td>Amazon.com Inc.</td>
</tr>
<tr>
<td>Marc Andreessen</td>
<td>CTO</td>
<td>America Online Inc.</td>
</tr>
<tr>
<td>Keith Leonard</td>
<td>Director of IS</td>
<td>Amgen Inc.</td>
</tr>
<tr>
<td>Alan Jones</td>
<td>CIO</td>
<td>AT&amp;T Corp.</td>
</tr>
<tr>
<td>James D. Dixon</td>
<td>CIO</td>
<td>Bank of America</td>
</tr>
<tr>
<td>Marvin Adams</td>
<td>CIO</td>
<td>Bank One Corp.</td>
</tr>
<tr>
<td>Art Levin</td>
<td>CIO</td>
<td>Becton, Dickinson and Co.</td>
</tr>
<tr>
<td>Francis A. Dramis Jr.</td>
<td>Executive VP and CIO</td>
<td>BellSouth Corp.</td>
</tr>
<tr>
<td>Richard Knight</td>
<td>Director of IS</td>
<td>Biogen Inc.</td>
</tr>
<tr>
<td>Tom Secunda</td>
<td>Founding Partner</td>
<td>Bloomberg LP</td>
</tr>
<tr>
<td>Robert Krenitsky</td>
<td>VP of Information Technology</td>
<td>BlueCross &amp; BlueShield of Central New York</td>
</tr>
<tr>
<td>Dave McDowell</td>
<td>VP of Information Technology</td>
<td>BlueCross &amp; BlueShield of Rochester Area</td>
</tr>
<tr>
<td>Scott Griffin</td>
<td>CIO</td>
<td>Boeing Co.</td>
</tr>
<tr>
<td>John Leggate</td>
<td>Group VP of IT</td>
<td>BP AMERICA INC</td>
</tr>
<tr>
<td>Scott Teissler</td>
<td>CIO</td>
<td>Cable News Network Inc. (CNN)</td>
</tr>
<tr>
<td>James Donehey</td>
<td>CIO</td>
<td>Capital One Financial Corp.</td>
</tr>
<tr>
<td>Dawn Lepore</td>
<td>Executive VP and CIO</td>
<td>Charles Schwab Corp.</td>
</tr>
<tr>
<td>Peter Solvik</td>
<td>Senior VP of IS and CIO</td>
<td>Cisco Systems Inc.</td>
</tr>
<tr>
<td>Edward D. Horowitz</td>
<td>Senior Corporate Officer of Citigroup and Head of e-Citi CIO</td>
<td>Citigroup Inc.</td>
</tr>
<tr>
<td>William S. Herald</td>
<td>Senior VP of Engineering</td>
<td>Coca-Cola Co.</td>
</tr>
<tr>
<td>Bradley P. Dusto</td>
<td>Executive VP of Global Information and Administration CIO</td>
<td>Comcast Cable Communications Inc.</td>
</tr>
<tr>
<td>Gary Quinn</td>
<td>CIO</td>
<td>Computer Associates International Inc.</td>
</tr>
<tr>
<td>Brian C. Henry</td>
<td>VP and CIO</td>
<td>Convergys Corp.</td>
</tr>
<tr>
<td>Richard J. Fishburn</td>
<td>Senior VP and CIO</td>
<td>Corning Inc.</td>
</tr>
<tr>
<td>Susan J. Unger</td>
<td>Senior VP and CIO</td>
<td>DaimlerChrysler AG</td>
</tr>
<tr>
<td>Jerry N. Gregoire</td>
<td>Senior VP and CIO</td>
<td>Dell Computer Corp.</td>
</tr>
<tr>
<td>Stephen D. Sprinkle</td>
<td>Managing Director of Service Lines</td>
<td>Deloitte Consulting</td>
</tr>
<tr>
<td>David P. Roth</td>
<td>Senior VP of IS and Services</td>
<td>Discovery Communications Inc.</td>
</tr>
<tr>
<td>Michael Wilson</td>
<td>Senior VP of Product</td>
<td>eBay Inc.</td>
</tr>
<tr>
<td>Richard Causey</td>
<td>Senior VP and Chief Accounting and Information Officer Senior VP and CIO CIO</td>
<td>Enron Corp.</td>
</tr>
<tr>
<td>John T. McCreadie</td>
<td>CIO, and President and COO of E-Trade Technologies VP and CIO CTO</td>
<td>Ernst &amp; Young LLP</td>
</tr>
<tr>
<td>Debra Chrapaty</td>
<td>Senior VP and CIO</td>
<td>E-Trade Group Inc.</td>
</tr>
<tr>
<td>John Sommerwerck</td>
<td>Senior VP and CIO</td>
<td>Excellus, Inc.</td>
</tr>
<tr>
<td>Keith Crossley</td>
<td>Senior VP and CIO</td>
<td>Excellus, Inc.</td>
</tr>
<tr>
<td>Christopher T. Hjelm</td>
<td>Senior VP and CIO</td>
<td>Federal Express Corp.</td>
</tr>
<tr>
<td>John Kelley</td>
<td>Senior VP and CIO</td>
<td>First Tennessee National Corp.</td>
</tr>
<tr>
<td>Jeremy Seligman</td>
<td>Senior VP and CIO</td>
<td>Frontier Corporation</td>
</tr>
<tr>
<td>Gary M. Reiner</td>
<td>Senior VP and CIO</td>
<td>General Electric Co.</td>
</tr>
<tr>
<td>Patrick J. Zilvitis</td>
<td>Senior VP and CIO</td>
<td>Gillette Co.,</td>
</tr>
<tr>
<td>Jeffrey D. Liotta</td>
<td>Senior VP and CIO</td>
<td>GreenMountain.com Co.</td>
</tr>
<tr>
<td>Steve Hawn</td>
<td>Senior VP and CIO</td>
<td>Hallmark Cards Inc.</td>
</tr>
<tr>
<td>David J. Storm</td>
<td>Senior VP and CIO</td>
<td>Harley-Davidson Motor Co.</td>
</tr>
<tr>
<td>Michael J. Rose</td>
<td>Senior VP and CIO</td>
<td>Hewlett-Packard Co.</td>
</tr>
<tr>
<td>Ronald B. Griffin</td>
<td>Senior VP of IS</td>
<td>Home Depot Inc.</td>
</tr>
<tr>
<td>Stephen M. Ward</td>
<td>VP of Business Transformation and CIO CIO</td>
<td>IBM Corp.</td>
</tr>
<tr>
<td>Craig Friedrich</td>
<td>Senior VP and CTO</td>
<td>InFocus Systems Inc.</td>
</tr>
<tr>
<td>David M. Carlson</td>
<td>Director of IS</td>
<td>Ingram Micro Inc.</td>
</tr>
<tr>
<td>Chris Montagnon</td>
<td>Director of IS</td>
<td>J. Sainsbury PLC</td>
</tr>
</tbody>
</table>
JoAnn H. Heisen
Robert Meltzer
James R. Kinney
Herbert G. Vinnicombe
William Baggeroe
Carl Wilson
Robert Rodin
Edward Wojciechowski
Ronald W. Davies
Diane Duggan
Dennis Beiderman
Hassan Dayem
Rick Devenuti
Bertrand Loy
Glenn Bonner
Les Shroyer
Gregor S. Bailar
Richard LaFavre
Mike Busch
David Thompson
William C. Steere Jr.
Ellen Knapp
Peter Lewis
Stephen E. Michaelson
Norm Fjeldheim
Paul Roman
Neal Bibeau
Carol Kelly
Terrel B. Jones
Al Wizdo
Charlie Dunham
Jean Chevallier
Jerry Miller
Ross Holman
Brian T. Light
Deborah Gillotti
John A. Fiore
H. William Howard
H. John Lochow
William D. Friel
Patrick Kelly
Donald R. Walker
Bob Saur
James T. Ryan
Randall Mott
Betsy Foster
Patricia A. Cusick
Timothy Koogle
Thomas L. Smith

VP and CIO
CTO
Senior VP and CIO
VP and CIO
CIO
Executive VP and CIO
President and CEO
Corporate VP of IT
Senior Vice Chairman
CIO
Director of IS
VP of IS and CIO
VP and CIO of IT Group
VP of IT
VP and CIO
CIO
Executive VP and CIO
CIO
CIO
Senior VP and CIO
VP of IS
VP of IT
Senior VP and CIO
VP of Systems
Senior VP and CIO
Senior VP and CIO
CIO and Head of IT
Executive VP and CIO
Senior VP and CIO
CFO
CIO
CIO
Senior VP and CIO
VP of IS
CIO
VP and CIO
VP and CIO
Chairman and CEO
President of Yellow Services Inc.

Johnson & Johnson
Kinko's Inc., Corporate Office
Kraft Foods Inc.
Lucent Technologies Inc.
Maiden Mills Industries Inc.
Marriott International Inc.
Marshall Industries
Maytag Corp.
MBNA Corp.
MCI WorldCom Inc.
Menasha Corp.
Merck & Co. Inc.
Microsoft Corp.
Millipore Corp.
Mirage Resorts Inc.
Motorola Inc.
National Association of Securities Dealers (NASD)
Nextel Communications Inc.
Patagonia Inc.
PeopleSoft Inc.
Pfizer Inc.
PricewaterhouseCoopers LLP
Progressive Corp.
PRT Group Inc.
Qualcomm Inc.
Quantum Corp.
Rosenbluth International
Sabre Inc.
Sabre Inc.
SAP America Inc.
SAS Institute Inc.
Schlumberger Ltd.
Sears, Roebuck and Co.
Southwest Airlines
Staples Inc.
Starbucks Coffee Co.
State Street Corp.
Sun Microsystems Inc.
Tech Data Corp.
The Prudential Insurance Co. of America
Trilogy Software Inc.
United Services Automobile Association (USAA)
Vialog Corp.
W. W. Grainger, Inc.
Wal-Mart Stores Inc.
Whole Foods Market Inc.
Xerox Corp.
Yahoo Inc.
Yellow Corp.
Jeffrey Pankow  
242 Jersey Street  
Caledonia, NY 14423

Information Technology  
Infrastructure Stability Questionnaire

«Name»  
«Address1»  
«Address2»  
«City», «State» «Zip»

Wednesday, September 20, 2000

Dear Information Technology Executive:

I am a graduate student at Rochester Institute of Technology and am completing work for my M.S. degree in Information Technology. In a preliminary survey I conducted last year, I found that achieving IT infrastructure stability was a high priority goal of IT executive management. My master's thesis is investigating the factors that impact IT infrastructure stability and the relationships of this stability to business operations and organizational adaptability. I am using the term stability to mean the seamless support of business operations and goals over time.

To that end, I would greatly appreciate your help by completing the attached survey. Please feel free to make comments where applicable. The survey is a self-mailer with postage already included. Once completed, please fold it in half, secure the middle together, and drop in the mail.

If you have any questions or comments, please feel free to give me a call at 716.238.4642 (W) or 716.538.4744 (H). Or you can e-mail me at PANKORP@AOL.COM. Again, your time in answering the attached questionnaire is greatly appreciated.

Sincerely,

Jeffrey Pankow
Please take a moment to complete the following survey. Fold the completed survey in half with my return address visible on the outside, secure the closed end and drop in the mail.

Using the following definitions: **Information Technology (IT) infrastructure**: The hardware, software, and staff that make up the systems and processes on which organizational applications reside; and **Stability**: The ability to seamlessly support business goals and operations over time. Please answer the following questions:

1. How important is the stability of your IT infrastructure for achieving business goals?
   - Critical
   - Very Important
   - Moderately Important
   - Not important
   Comments: __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________

2. What impacts have organizational change had on the stability of your IT infrastructure?
   - No impact
   - Impact
   Explain: __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________

3. Is it more difficult to maintain a stable IT infrastructure today than in the past?
   - Yes
   - No
   Comments: __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________

4. Will it be more difficult to maintain a stable IT infrastructure in the future?
   - Yes
   - No
   Comments: __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
5. What are the most significant factors impacting the stability of your IT infrastructure?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

6. What are the most important factors in developing and maintaining a stable IT infrastructure?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

7. Are there any aspects of stability that you consider important that I missed in this survey?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

8. Would you like to receive a summary of my findings?
   - Yes
   - No

9. Personal Data (Optional)
   Name:________________________
   Org:________________________
   E-mail:_____________________
   Phone:______________________
   Fax:_______________________

THANK YOU!
# Appendix D: Mailing list for Survey 2

Respondents are in **BOLD**.

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>CORPORATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>David Starr</td>
<td>CIO</td>
<td>3Com Corp.</td>
</tr>
<tr>
<td>David P. Drew</td>
<td>VP of IT</td>
<td>3M</td>
</tr>
<tr>
<td>Paul Ingevaloson</td>
<td>Sr. VP</td>
<td>Ace Hardware Corp.</td>
</tr>
<tr>
<td>David Dixon</td>
<td>CIO</td>
<td>Administaff Inc.</td>
</tr>
<tr>
<td>Chris Daley</td>
<td>CIO</td>
<td>Aetna, Inc.</td>
</tr>
<tr>
<td>William Parker</td>
<td>CIO</td>
<td>Agway Inc.</td>
</tr>
<tr>
<td>Joseph McMakin</td>
<td>VP, MIS</td>
<td>Air Products &amp; Chemicals Inc.</td>
</tr>
<tr>
<td>Robert Reeder</td>
<td>VP, IT</td>
<td>Alaska Airlines Inc.</td>
</tr>
<tr>
<td>Patrick Steele</td>
<td>Exec. VP, IS</td>
<td>Albertson’s Inc.</td>
</tr>
<tr>
<td>Larry E. Kittelberger</td>
<td>Senior VP and CIO</td>
<td>AlliedSignal Inc.</td>
</tr>
<tr>
<td>Frank Pollard</td>
<td>Sr. VP</td>
<td>Allstate Corp.</td>
</tr>
<tr>
<td>Richard L. Dalzell</td>
<td>VP and CIO</td>
<td>Amazon.com Inc.</td>
</tr>
<tr>
<td>Marc Andreessen</td>
<td>CTO</td>
<td>America Online Inc.</td>
</tr>
<tr>
<td>Allan Loren</td>
<td></td>
<td>American Express Co.</td>
</tr>
<tr>
<td>Charles M. Paulk Jr.</td>
<td></td>
<td>Andersen Consulting</td>
</tr>
<tr>
<td>Jane Niderberger</td>
<td>CIO</td>
<td>Anthem Insurance Co.</td>
</tr>
<tr>
<td>Alan Jones</td>
<td>CIO</td>
<td>AT&amp;T Corp.</td>
</tr>
<tr>
<td>Renato Crocetti</td>
<td>CIO</td>
<td>Automatic Data Processing</td>
</tr>
<tr>
<td>James D. Dixon</td>
<td>CIO</td>
<td>Bank of America</td>
</tr>
<tr>
<td>Marvin Adams</td>
<td>CIO</td>
<td>Bank One Corp.</td>
</tr>
<tr>
<td>Arthur Levin</td>
<td>VP, IT &amp; CIO</td>
<td>Becton, Dickinson and Co.</td>
</tr>
<tr>
<td>Francis A. Dramis Jr.</td>
<td></td>
<td>BellSouth Corp.</td>
</tr>
<tr>
<td>Richard Knight</td>
<td>Executive VP and CIO</td>
<td>Biogen Inc.</td>
</tr>
<tr>
<td>Tom Secunda</td>
<td>Director of IS</td>
<td>Bloomberg LP</td>
</tr>
<tr>
<td>Scott Griffin</td>
<td>Founding Partner</td>
<td>Boeing Co.</td>
</tr>
<tr>
<td>John Leggate</td>
<td>CIO</td>
<td>BP AMERICA INC</td>
</tr>
<tr>
<td>Scott Teissler</td>
<td>Group VP of IT</td>
<td>Cable News Network Inc. (CNN)</td>
</tr>
<tr>
<td>James Donehey</td>
<td>CIO</td>
<td>Capital One Financial Corp.</td>
</tr>
<tr>
<td>Carolyn G. Osborne</td>
<td>VP, IT</td>
<td>Carolina Power &amp; Light Co.</td>
</tr>
<tr>
<td>Dawn Lepore</td>
<td>Executive VP and CIO</td>
<td>Charles Schwab Corp.</td>
</tr>
<tr>
<td>Denis O'Leary</td>
<td></td>
<td>Chase Manhattan Corp., The</td>
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<tr>
<td>Donald L. Paul</td>
<td></td>
<td>Chevron Corp.</td>
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<tr>
<td>Peter Solvik</td>
<td></td>
<td>Cisco Systems Inc.</td>
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<tr>
<td>Edward D. Horowitz</td>
<td></td>
<td>Coca-Cola Co.</td>
</tr>
<tr>
<td>William S. Herald</td>
<td>CIO</td>
<td>Comcast Cable Communications Inc.</td>
</tr>
<tr>
<td>Bradley P. Dusto</td>
<td>Senior VP of Engineering</td>
<td>Computer Associates International Inc.</td>
</tr>
<tr>
<td>Gary Quinn</td>
<td>Executive VP of Global Information and Administration</td>
<td></td>
</tr>
<tr>
<td>Brian C. Henry</td>
<td>CIO</td>
<td>Convergys Corp.</td>
</tr>
<tr>
<td>Richard J. Fishburn</td>
<td>VP and CIO</td>
<td>Corning Inc.</td>
</tr>
<tr>
<td>Michael Matheny</td>
<td>CIO</td>
<td>Cracker Barrel Old Country Store, Inc.</td>
</tr>
<tr>
<td>Susan J. Unger</td>
<td>Senior VP and CIO</td>
<td>DaimlerChrysler AG</td>
</tr>
<tr>
<td>Jerry N. Gregoire</td>
<td>Senior VP and CIO</td>
<td>Dell Computer Corp.</td>
</tr>
</tbody>
</table>

RIT MS Project – J. Pankow 05/07/01 Page: 50
Stephen D. Sprinkle  
David P. Roth  
Cinda A. Hallman  
**Robert R. Ridout**  
Derek R. Mumford  
Michael Wilson  
Richard Causey  
William W. Snyder  
John T. McCreadie  
Debra Chrapaty  
Christopher T. Hjelm  
John Kelley  
Gary M. Reiner  
Charles F. Williams  
Patrick J. Zilvitis  
Jeffrey D. Liotta  
Steve Hawn  
David J. Storm  
Michael J. Rose  
Ronald B. Griffen  
Gary Osborn  
Stephen M. Ward  
Craig Friedrich  
David M. Carlson  
Carlene Ellis  
Chris Montagnon  
JoAnn H. Heisen  
Robert Meltzer  
James R. Kinney  
Herbert G. Vinnicombe  
William Baggeroer  
Carl Wilson  
Robert Rodin  
Edward Wojciechowski  
Ronald W. Davies  
Diane Duggan  
Dennis Beiderman  
Hassan Dayem  
Hassan Dayem  
Edward Goldberg  
Rick Devenuti  
Bertrand Loy  
Glenn Bonner  
Les Shroyer  
**Buddy Fiune**  
Gregor S. Bailar  
Richard LaFavre  

Managing Director of Service Lines  
Senior VP of IS and Services  
**VP of IS and CIO**  
VP, IT  
Senior VP of Product  
Senior VP and Chief Accounting and Information Officer  
Senior VP and CIO  
CIO  
CIO, and President and COO of E-Trade Technologies  
Senior VP and CIO  
Memphis Banking Group President  
Senior VP and CIO  
VP, Info.  
CTO  
VP of IT  
VP of Planning and IS  
VP and CIO  
Senior VP of IS  
VP of Corporate IT  
CIO  
Director of IS  
VP and CIO  
CTO  
Senior VP and CIO  
VP and CIO  
CIO  
Executive VP and CIO  
President and CEO  
Corporate VP of IT  
Senior Vice Chairman  
CIO  
Director of IS  
VP of IS and CIO  
VP of IS and CIO  
VP and CIO of IT Group  
VP of IT  
VP and CIO  
CIO  
CTO  
Executive VP and CIO  
CIO  

Deloitte Consulting  
Discovery Communications Inc.  
DuPont Co.  
**E.I. du Pont de Nemours and Co.**  
Eaton Corp.  
eBay Inc.  
Enron Corp.  
Enterprise Rent-A-Car Co.  
Ernst & Young LLP  
E-Trade Group Inc.  
Federal Express Corp.  
First Tennessee National Corp.  
General Electric Co.  
Georgia-Pacific Corp.  
Gillette Co.  
GreenMountain.com Co.  
Hallmark Cards Inc.  
Harley-Davidson Motor Co.  
Hewlett-Packard Co.  
Home Depot Inc.  
Hughes Space and Communications Co.  
IBM Corp.  
InFocus Systems Inc.  
Ingram Micro Inc.  
Intel Corp.  
J. Sainsbury PLC  
Johnson & Johnson  
Kinko's Inc., Corporate Office  
Kraft Foods Inc.  
Lucent Technologies Inc.  
Malden Mills Industries Inc.  
Marriott International Inc.  
Marshall Industries  
Maytag Corp.  
MBNA Corp.  
MCI WorldCom Inc.  
Menasha Corp.  
Merck & Co. Inc.  
Merck & Co. Inc.  
Merrill Lynch & Co. Inc.  
Microsoft Corp.  
Millipore Corp.  
Mirage Resorts Inc.  
Motorola Inc.  
**Nabisco Holdings Corp.**  
National Association of Securities Dealers (NASD)  
Nextel Communications Inc.  

RIT MS Project – J. Pankow 05/07/01 Page 51
Doug Schwinn
Mike Busch
David Thompson
Allan B. Deering
William C. Steere Jr.
Ellen Knapp
Peter Lewis
Stephen E. Michaelson
Norm Fjeldheim

CIO
Chairman and CEO
Global CIO
CEO
Senior VP and CIO
VP and CIO
VP and Acting CIO
CIO
CIO
Mgr., IS
VP of Marketing and CIO
CIO
CIO
VP of IS
VP of IT
CIO
VP, MIS
CIO
VP of Systems
Senior VP and CIO
Senior VP and CIO
CIO and Head of IT
CIO
CIO
Executive VP and CIO
Senior VP and CIO
CFO
CIO
VP E-Commerce
CIO
Dir. IT
CIO
VP of IS
VP
VP and CIO
VP and CIO
Chairman and CEO
President of Yellow Services Inc.

OfficeMax Inc.
Patagonia Inc.
PeopleSoft Inc.
PepsiCo Inc.
Pfizer Inc.
PricewaterhouseCoopers LLP
Progressive Corp.
PRT Group Inc.
Qualcomm Inc.
Quantum Corp.
Qwest Communications
Rite Aid Corp.
Roadway Express Inc.
Rochester Gas and Electric Corp.
Rosenbluth International
Sabre Inc.
SAP America Inc.
SAS Institute Inc.
Schlumberger Ltd.
Sears Roebuck and Co.
Shomey's Inc.
Silicon Graphics Inc.
Southwest Airlines
Staples Inc.
Starbucks Coffee Co.
State Street Corp.
Storage Technology Corp.
Sun Microsystems Inc.
Tech Data Corp.
The Prudential Insurance Co. of America
Trilogy Software Inc.
U.S. Steel Group
United Airlines
United Services Automobile Association (USAA)
United States Department of State
USEC Inc.
Vanguard Group Inc.
Vialog Corp.
W. W. Grainger, Inc.
Wendy's Inc.
Whole Foods Market Inc.
Wm. Wrigley Jr. Co.
Xerox Corp.
Yahoo Inc.
Yellow Corp.
7. Appendix E – Samples of Survey Responses

This section includes copies of survey responses from the following IT executives:

- David Thompson, CIO PeopleSoft Inc
- Buddy Fiume, CTO, Nabisco Holdings Corp
- Dick LeFave, CIO, Nextel Communications Inc (E-Mail)
- Robert Robless, CIO, United Airlines E-Commerce Division
- Rick Dalzell, CIO, Amazon.com Inc.
- Diane Drum, Vice President, E.I. du Pont de Nemours and Co.
- Jerry Miller, CIO, Sears, Roebuck and Co.
Please take a moment to complete the following survey. Fold the completed survey in half with my return address visible on the outside, secure the closed end and drop in the mail.

Using the following definitions: **Information Technology (IT) infrastructure**: The hardware, software, and staff that make up the systems and processes on which organizational applications reside; and **Stability**: The ability to seamlessly support business goals and operations over time. Please answer the following questions:

<table>
<thead>
<tr>
<th>1. How important is the stability of your IT infrastructure for achieving business goals?</th>
<th>3. Is it more difficult to maintain a stable IT infrastructure today than in the past?</th>
</tr>
</thead>
</table>
| ☑ Critical | □ Yes  
☑ No  
☐ Not important  
Comments: Infrastructure stability enables productivity for users, retention for the field, credibility for IT, and directly drives top line growth in several offerings. |

| 2. What impacts have organizational change had on the stability of your IT infrastructure? | 4. Will it be more difficult to maintain a stable IT infrastructure in the future? |
| ☑ Impact | □ Yes  
☑ No  
Comments: Org change is often required to achieve higher levels of stability as both business needs and processes mature. Like most change, the short-term impact can be negative but the long-term result is higher stability. |

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Survey - J. Pankow</td>
<td>09/29/00</td>
</tr>
</tbody>
</table>
5. What are the most significant factors impacting the stability of your IT infrastructure?

- pressures to reduce cost
- evolving standards
- product quality
- employee retention
- information security
- business priority / the ability to maintain case for stability vs other opportunities

6. What are the most important factors in developing and maintaining a stable IT infrastructure?

- architecture
- ensuring an IT-wide focus on stability across systems, network, operations, and support
- employee training / retention
- funding

7. Are there any aspects of stability that you consider important that I missed in this survey?

Stability is often a conscious (or unconscious) choice that competes with other IT/business priorities. Although very interrelated, stability can't be discussed in a vacuum.

8. Would you like to receive a summary of my findings?

☐ Yes  ☐ No

9. Personal Data (Optional)

Name: ____________________________
Org: ____________________________
E-mail: david.thompson@peoplesoft.com
Phone: __________________________
Fax: ____________________________

THANK YOU!

IT Survey – J. Pankow
09/29/00
Please take a moment to complete the following survey. Fold the completed survey in half with my return address visible on the outside, secure the closed end and drop in the mail.

Using the following definitions: **Information Technology (IT) infrastructure**: The hardware, software, and staff that make up the systems and processes on which organizational applications reside; and **Stability**: The ability to seamlessly support business goals and operations over time. Please answer the following questions:

### 1. How important is the stability of your IT infrastructure for achieving business goals?
- [ ] Critical
- [ ] Very Important
- [ ] Moderately Important
- [ ] Not important

Comments:

Continuous up time and ability to scale quickly are critical to our business effectiveness.

### 2. What impacts have organizational change had on the stability of your IT infrastructure?
- [ ] No impact
- [ ] Impact

Explain:

Organizational change unfortunately can result in staff discontinuities and retention failures. Concurrently, the environment is more complex and less understood due to the change. This "double whammy" is damaging.

### 3. Is it more difficult to maintain a stable IT infrastructure today than in the past?
- [ ] Yes
- [ ] No

Comments:

"Virtually all business operations are dependent on IT. When systems are down, the business processes stop. This is much more the case now than it was a few years ago."

### 4. Will it be more difficult to maintain a stable IT infrastructure in the future?
- [ ] Yes
- [ ] No

Comments:

"E-Business and an increased emphasis on external business partner linkages (i.e. IT systems) will make future infrastructure maintenance more difficult."

IT Survey – J. Pankow
09/29/00
5. What are the most significant factors impacting the stability of your IT infrastructure?
- Rapid growth in system use
- Extremely focused networking
- Decrease in integrated system results in complex interfaces and strain on middleware & connectors. These are inherently less stable.

6. What are the most important factors in developing and maintaining a stable IT infrastructure?
- Standards & definitions
- Governance & a defined technical architecture
- Discipline to de-commission legacy systems before they become unmanageable
- Comprehensive and integrated systems management capability

7. Are there any aspects of stability that you consider important that I missed in this survey?
- The need for Corporate willingness to set and use uniform standards - even when some business units will disagree on central.
- Stability is strongly related to complexity. Focus should be on comprehensive, but simple infrastructures

8. Would you like to receive a summary of my findings?
- Yes ☐ No ☐

9. Personal Data (Optional)
Name: Buddy Fiume
Org: Chief Tech Office - Nabisco
E-mail: fiumeb@nabisco.com
Phone: 973 682 6900
Fax:

THANK YOU!
I thought I would respond to your questionnaire via e-mail.

1. Stability: The IT infrastructure is fundamental to operating NEXTEL. We need to be 7X24 and we need to keep operational support systems functioning with little downtime. The current environment with numerous links to web based services and interfaces to legacy systems make the fundamental engines essential to keeping the business viable.

2. Organizational Change: a major factor and one that if not managed will contribute to disruption. The IT team must be focused on customer affecting principles and have a clear line of sight into how their role affects product delivery.

3. Current Stability: The introduction of many points of failure with the advent of the web is a major challenge. In the convention 3 tier architecture the touch points were defined and measurable. The tools to do that today are evolving and frankly a collage of good solutions and snake oil.

4. Future: It should settle down as we build better firewalls and induce a 3rd party development environment, where programmers can add content with minimal impact.

5. Impacts
   a. Web based applications
   b. Evolving networks
   c. Time to market software solutions
   d. Lack to solid end-to-end tools

6. What we need: Good tools and a solid business basis for IT. A good shop is based on sound reporting and tracking fundamentals. I focus my managers on running the IT operation like their own business. I would also say IT needs to provide a platform for innovation and it should not just support the business but also stimulate the business processes.

7. Other aspects:
   a. Outsourcing is a viable way to stay focused and achieve high return on investment if managed right
   b. Have a solid customer facing organization in the infrastructure
   c. Manage the web as part of the infrastructure
   d. Hire good people
   e. Communicate with your customers !!!!
f. BENCHMARK against the best companies regardless of industry

Jeff hope this helps...call me if I can help and best of luck in your studies

Dick Le Fave
SVP and CIO
NEXTEL COMMUNICATIONS
703-552-
Please take a moment to complete the following survey. Fold the completed survey in half with my return address visible on the outside, secure the closed end and drop in the mail.

Using the following definitions: **Information Technology (IT) infrastructure**: The hardware, software, and staff that make up the systems and processes on which organizational applications reside; and **Stability**: The ability to seamlessly support business goals and operations over time. Please answer the following questions:

<table>
<thead>
<tr>
<th>1. How important is the stability of your IT infrastructure for achieving business goals?</th>
</tr>
</thead>
</table>
| ✓ Critical  
| ☐ Very Important  
| ☐ Moderate Important  
| ☐ Not important  |

*Comments:*

United Airlines depends upon united.com to be available for business 24x7x365. United.com loses $100,000 per 1/2 hour it is not available.

<table>
<thead>
<tr>
<th>2. What impacts have organizational change had on the stability of your IT infrastructure?</th>
</tr>
</thead>
</table>
| ☑ No impact  
| ☐ Impact  |

*Explain:*

United has considered the system from organizational change by ensuring that processes are clearly defined and documented.

<table>
<thead>
<tr>
<th>3. Is it more difficult to maintain a stable IT infrastructure today than in the past?</th>
</tr>
</thead>
</table>
| ☑ Yes  
| ☐ No  |

*Comments:*

Today's infrastructure is a patchwork of technology that is more tightly coupled than integrated.

<table>
<thead>
<tr>
<th>4. Will it be more difficult to maintain a stable IT infrastructure in the future?</th>
</tr>
</thead>
</table>
| ☑ No  
| ☐ Yes  |

*Comments:*

We are learning how to deal with tightly coupled infrastructures.
5. What are the most significant factors impacting the stability of your IT infrastructure?

- Complexity of technology:
  Most new technology platforms are not mature enough yet to leave all the old operational tables & clusters of the old mainframe systems.
- Lack of experienced staff:
  Staff who understand the newer technologies tend to be frustrated developers or network buddies. They do not have the necessary discipline to ensure stable IT infrastructures. On the other hand, those who are not experienced in the technology...

6. What are the most important factors in developing and maintaining a stable IT infrastructure?

- Realizing that you are trying to maintain an infrastructure made up of several moving components.
- Designing an infrastructure architecture that is flexible, scalable & adaptable.
- Good people with the discipline who can manage change through machine process descriptions.

7. Are there any aspects of stability that you consider important that I missed in this survey?

- Negotiating flexible & scalable contracts to license hardware & software.
- Establishing mutually beneficial partnerships with technology vendors.

8. Would you like to receive a summary of my findings?

☐ Yes  ☐ No

9. Personal Data (Optional)

Name: Robert L. Reckless, Ph.D
Org: United Airlines E-Commerce Division
E-mail: robotless@ual.com
Phone:
Fax:

THANK YOU!
Please take a moment to complete the following survey. When you have completed the survey, fold it in half with my return address visible on the outside, tape the middle together and drop in the mail.

### A. About yourself

1. What is your title?
   - [ ] CIO
   - [ ] VP Information Technology
   - [ ] CTO
   - [ ] Director/Manager
   - [ ] Other: ____________________________

2. How long have you been in your current position?
   - [ ] < 6 months
   - [ ] 6-12 months
   - [ ] 1-2 years
   - [ ] 2-5 years
   - [ ] > 5 years

3. How long have you been in IT?
   - [ ] < 5 years
   - [ ] 5-10 years
   - [ ] > 10 years

### B. Your Company

4. Company’s estimated gross revenue (in $Millions)?
   - [ ] < $50
   - [ ] $51-500
   - [ ] $501-1,000
   - [ ] $1,000-10,000
   - [ ] >$10,000

5. Number of employees?
   - [ ] < 50
   - [ ] 51-250
   - [ ] 251-1,000
   - [ ] 1,001-10,000
   - [ ] >10,000

6. Number of IT Staff?
   - [ ] < 25
   - [ ] 26-100
   - [ ] 101-500
   - [ ] 501-1,000
   - [ ] >1,000

7. What is the primary function of your company?
   - [ ] Manufacturing
   - [ ] Services
   - [ ] Other: ____________________________

### C. Your IT Environment

8. How do you measure the success of your IT organization/projects?
   - a. Service Level Agreement
   - b. Cost Benefit Analysis
   - c. Return on Investment
   - d. Customer Satisfaction
   - e. Total Cost of ownership
   - f. Other: ____________________________

9. Which of the following are/were primary IT goals for you? Have you achieved them? Check each box that applies.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Goal In Progress</th>
<th>Goal Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. E-commerce</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>b. Stabilize IT</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>c. ERP implementation</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>d. Data Warehouse</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>e. Client-Server</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>f. Other:</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

10. What do you plan on focusing on in the next 1-2 years?
    
    ____________

   a. 3-5 years

   ____________________________
D. Stability of IT Infrastructure

Given that the following definition applies: Stability of the Information Technology infrastructure is "The ability of the Information Technology organization (hardware, software, staff, and related units) to seamlessly support business goals and operations over time." Please answer the following questions:

11. Is your IT organization divided into multiple departments or divisions?
   - No
   - Yes
   a. If Yes, please indicate the major divisions or departments:
      ____________________________
      ____________________________
      ____________________________

12. Do you have multiple IT locations?
   - No
   - Yes
   a. If Yes, what impact do multiple locations have on the stability of your IT organization?
      ____________________________
      ____________________________
      ____________________________
      ____________________________

13. Do you outsource any IT functions?
   - No
   - Yes
   a. If Yes, what functions do you outsource and how has outsourcing affected the stability your IT organization?
      ____________________________
      ____________________________
      ____________________________
      ____________________________

14. Do you believe over the past 5 years it has become increasingly more difficult to maintain a stable IT infrastructure?
   - No
   - Yes
   a. If Yes, what do you attribute this to and what steps have you taken to address?
      ____________________________
      ____________________________
      ____________________________
      ____________________________

15. Do you believe there will be increased pressures on the stability of your IT infrastructure in the next 5 years?
   - No
   - Yes
   a. If Yes, what are they and how do you plan to address them?
      ____________________________
      ____________________________
      ____________________________
      ____________________________

E. Personal Data (Optional)

16. Name:  

Org:  

E-mail:  

Phone:  

Fax:  

17. Would you like access information about my Thesis once it is complete?
   - Yes
   - No

THANK YOU!
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1. How important is the stability of your IT infrastructure for achieving business goals?
   - Critical
   - Very Important
   - Moderately Important
   - Not important

   Comments: ____________________________________________________________________________

2. What impacts have organizational change had on the stability of your IT infrastructure?
   - No impact
   - Impact

   Explain: _______________________________________________________________________________

   Comments: ____________________________________________________________________________

3. Is it more difficult to maintain a stable IT infrastructure today than in the past?
   - Yes
   - No

   Comments: ____________________________________________________________________________

4. Will it be more difficult to maintain a stable IT infrastructure in the future?
   - Yes
   - No

   Comments: ____________________________________________________________________________

IT Survey – J. Pankow

09/29/00
5. What are the most significant factors impacting the stability of your IT infrastructure?
- Turnover in workforce
- Design for supportability

6. What are the most important factors in developing and maintaining a stable IT infrastructure?
- Retention
- Recruitment
- Training and other development opportunities

7. Are there any aspects of stability that you consider important that I missed in this survey?

8. Would you like to receive a summary of my findings?
☐ Yes ☐ No

9. Personal Data (Optional)
Name: Diane Drum
Org: DuPont
E-mail: diane.e.drum@us.dupont
Phone: 302 892-1964
Fax: 302 892-8050

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   - ☐ Services
   - ☐ Other: 

### C. Your IT Environment

8. How do you measure the success of your IT organization/projects?
   - Yes, used
   - Not used
   - a. Service Level Agreement
   - b. Cost Benefit Analysis
   - c. Return on Investment
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   - e. Total Cost of ownership
   - f. Other:

9. Which of the following are/were primary IT goals for you? Have you achieved them? Check each box that applies.
   - a. E-commerce
   - b. Stabilize IT
   - c. ERP implementation
   - d. Data Warehouse
   - e. Client-Server
   - f. Other:

10. What do you plan on focusing on in the next 1-2 years?
    - ☐ 3-5 years
    - ☐ 6 years
    - ☐ Other:

---

IT Survey – J. Pankow

11/19/99
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     a. If Yes, please indicate the major divisions or departments:

     1. Sales
     2. Logistics
     3. IT
     4. Human Resources
     5. Operations

12. Do you have multiple IT locations?
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   - No
   - Yes
     a. If Yes, what are they and how do you plan to address them?

E. Personal Data (Optional)

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    Org: JEHK
    E-mail: jmh@smith.com
    Phone: (801) 296-7009
    Fax:

17. Would you like access information about my Thesis once it is complete?
   - Yes
   - No

THANK YOU!
8. References

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