



---

## ***Complementary Investment in Change Management and IT Investment Payoff***

**Susan A. Sherer**

*College of Business and Economics, Lehigh University,  
Bethlehem, PA 18015, USA  
E-mail: sas6@lehigh.edu*

**Rajiv Kohli**

*Mendoza College of Business, University of Notre Dame,  
Notre Dame, IN 46556, USA*

**Ayelet Baron**

*Worldwide Strategy and Planning, Worldwide Sales, Cisco  
Systems, Inc., 170 West Tasman Dr., San Jose, CA 95134, USA  
E-mail: ayelet@cisco.com*

---

**Abstract.** *Measuring information technology payoff continues to be a challenge for organizations. Considering the impact of complementary investments on IT payoff has been proposed by recent studies. This paper examines the impact of one type of complementary investment on IT payoff: organizational change management initiatives to support IT implementation. The paper reports a case study of Cisco Systems' IT investment in an operating systems upgrade of over 34,000 computer systems in 117 countries. The findings of the exploratory case study indicate that planned communications and change management strategies developed by their Organizational Change Management group led to the smooth implementation of the upgrade process and contributed to the payoff from the IT investment, measured in terms of client satisfaction with the process and system and reduced cost and time to upgrade all systems. The findings were supported by pre- and post-implementation surveys of clients, analysis of the change management initiatives and their impact on the process, and comparison of actual and budgeted costs for the project.*

**Key Words.** *change management, complementary investment, IT payoff, organizational change management*

### **1. Introduction**

Companies in the forefront of e-business today must invest in new applications while continuing to upgrade existing infrastructure to enable application sharing and communication among internal members as well as business partners. Given that IT projects can involve large investments and they often compete with other

projects for funding, senior managers want to insure they provide expected returns. However, measuring IT investment payoff remains a challenge for businesses (Bannister, 2001; Harker, 1995). Our understanding of IT's role in creating business value is still incomplete and requires further research on factors that contribute to successfully converting the IT investment into business value (Brynjolfsson and Hitt, 2000; Kohli and Devaraj, 2003).

The challenge in measuring the impact of IT emanates from the complexity arising from process and business changes that co-occur in and outside the organization (Barua, Lee, and Whinston, 1996; Davern and Kauffman, 2000; Powell and DentMicallef, 1997). Past studies have treated IT investment as a 'black box' with little consideration for complementary changes in the organization. Complementary changes are defined as changes in business processes and human capital (Davern and Kauffman, 2000) or reporting structure (Barua, Lee, and Whinston, 1996) to harmonize the investment in information technology. IT payoff is generally considered as the value to the organization returned by the investment in information technology. Accounting for the complementary changes within the organization has been suggested as fundamental to our understanding of the role of IT in adding value to organizational initiatives (Powell and DentMicallef, 1997).

Investments in complementary assets are critical to understanding the return on IT investments (Davern and Kauffman, 2000). In particular, the management of change in the implementation of technology is a complementary investment that has generally been overlooked in the IT payoff literature. As the rate of change accelerates, the orderly and coordinated implementation of technology has become a leading cause of system failures. One-third of customer relationship management (CRM) implementations yield no return, another third yield only minor benefits (Coffee, 2001). Ninety percent of enterprise resource planning (ERP) implementations end up late or over budget (Fryer, 1999).

The change management and IT project implementation literature suggests that the most successful projects stress the importance of (1) overcoming resistance to change and (2) effective communications to manage the change process (Cobb, Folger, and Wooten, 1995; Lucas, Ginzberg, and Schultz, 1990; Wanberg and Banas, 2000). Strong sponsorship, clear expectations, user involvement, and skilled change agents can help overcome resistance to change. Effective communication strategies should be relevant to each stakeholder. While there have been studies indicating the importance of these critical success factors leading to successful projects, there has been limited research linking these changes with actual payoff metrics. We propose that there are some distinctive similarities between managing organizational change and other complementary changes such as organizational reporting structure, reward systems and process redesign. Just as these changes contribute to IT payoff, preparing and managing such change enables the IT and IT-led changes to take hold.

The objective of this paper is to examine the role and impact of the management of change on the payoff from the implementation of an operating system upgrade in a large multi-national organization that is at the forefront of e-business. Given that the implementation of the change management process as a complement to IT investment was a new initiative, the availability of metrics and related data were limited. Hence, we take a pragmatic approach to assessing IT payoff by drawing upon the organization's change management experience, identifying exploratory areas to substantiate the expected outcomes and providing suggestions for future studies.

Section 2 summarizes the literature and presents our framework for relating change management to IT

payoff. Section 3 provides background for the case. Section 4 describes metrics to assess the impact of the change management efforts on the implementation of the system upgrade. Section 5 concludes with suggestions for future research.

## 2. Literature Review and Framework

Literature on IT payoff suggests the need to consider complementary organizational change in order to measure IT payoff. The IT project implementation and change management literature support the importance of change management tools in promoting organizational change. We develop a framework for assessing the impact of change management on IT investment payoff.

### 2.1. IT payoff

IT payoff literature has struggled to explain the mixed results in studies over the past decade. For example, IT has demonstrated significant business value in strategic business applications such as EDI (Mukhopadhyay, Kekre, and Kalathur, 1995), institutional decision support systems (Kohli and Devaraj, 2003), and operational systems (Mukhopadhyay, Lerch, and Mangal, 1997). However, a number of studies have also indicated that IT's performance has been less than stellar (Sarker, 1999; Strassmann, 1985). Although many researchers have recognized the need for considering organizational factors in addition to IT investment (Brynjolfsson, 1993; Byrd and Marshall, 1997; Dewan and Min, 1997; Grover et al., 1998; Mahmood and Mann, 1997), few have considered them (Barua, Kriebel, and Mukhopadhyay, 1995; Devaraj and Kohli, 2000; Mukhopadhyay, Kekre, and Kalathur, 1995; Weill, 1992). The process of IT investment leading to payoff should be examined in greater detail because an investment in IT need not imply that it was implemented appropriately. Many IT initiatives fail because they focus on implementing the solution rather than the adoption of the solution or tool and the corresponding business value.

Among the reasons for equivocal results has been the absence of contextual conditions (Barua, Lee, and Whinston, 1996; Barua and Mukhopadhyay, 2000; Powell and DentMicallef, 1997). Soh and Markus (1995) propose that the IT investment process should be broken down further to examine if it created the

appropriate IT assets, and if such assets lead to the appropriate IT impacts. Other studies have examined the context of IT payoff by examining redesigned business processes when complemented with IT payoff (Davern and Kauffman, 2000; Devaraj and Kohli, 2000; Mooney, Gurbaxani, and Kraemer, 1996). Nevertheless, opening the 'black box' of the process of payoff provides insights into how IT adds value and which organizational imperatives lead to the most value from IT.

Considering the social subsystem of managing change in IT implementations can provide much needed direction for what enables IT payoff. In particular when the IT related change is in high-risk initiatives, managers may be well advised to ensure that technical as well as contextual conditions such as receptivity to change are optimized. Clearly, payoff from IT is dependent upon its successful implementation of change management within the organization. Many change-related technology projects fail because they focus primarily upon deploying the technology. Not enough emphasis is placed on how people need to change how they work to adopt the new tool in their day-to-day work. There is a need to focus on the process; not just the tool. Further, the payoff metrics depend upon the type of value derived from IT. For instance, recent studies have emphasized that IT payoff can be manifested in productivity, profitability or consumer value, but not necessarily all three (Hitt and Brynjolfsson, 1996). Other studies have indicated that IT payoff metrics can also be found by examining the motivation of people, improvement in organizational processes and tasks (Chan, 2000; Lippitt, 1982; Lippitt, This, and Bidwell, 1971), and developing lasting relationships with customers (Kohli et al., 2001).

## 2.2. IT project implementation and change management

Researchers have used a number of different measures to evaluate the success of an information systems project including system use, user satisfaction, attitudes toward the system, degree to which the system accomplishes its objectives, and payoff to the organization (Lucas, Ginzberg, and Schultz, 1990). Factors found to affect the success of an IT implementation project are top management support (Lucas, 1981), user involvement (Baronas and Louis, 1988; Baroudi, Olson, and Ives, 1986; Debrabander and Edstrom, 1977; Ives and Olson, 1984), management of user expectations (Ginzberg, 1981), and user participation (Mumford and Henshall, 1979). Involvement

in the implementation process must be viewed in light of the communications patterns that exist between users and IT professionals (Debrabander and Edstrom, 1977). Software projects are fundamentally dependent upon effective communication among people (Boehm, 1988). Implementation of new information systems is as much a social and organizational process as the enabling technology deployment and success can be measured by both attitudinal and non-attitudinal variables (Lucas, Ginzberg, and Schultz, 1990).

Part of the social process of new system implementations involves adoption of the new solutions, which requires rigorous organizational change. The organizational change literature suggests that greater employee acceptance of change is associated with receipt of information about the change plan, participation in the change process, self efficacy for dealing with proposed changes, available support, and personal impact (Cobb, Folger, and Wooten, 1995; Wanberg and Banas, 2000). Attempts to change attitudes by providing information are only viable if users are involved in the implementation process (Bell, Harrison, and McLaughlin, 2000).

Sponsorship from top management is key to the success of every change initiative. The lack of sponsorship, or a champion at high levels in the organization, will make it almost impossible to succeed (Baron, 1999). If high-level sponsorship is lacking, there are three options for dealing with change management:

- (1) Educate the sponsor about his/her role by contracting with them and clearly defining their role in the change;
- (2) Replace the sponsor with someone else who can be effective in the role; or
- (3) Prepare for potential failure of the initiative.

The importance of change management has also been recognized in the business process reengineering literature. Change management involves effectively balancing forces in favor of a change over forces of resistance, which is most successfully accomplished with facilitators in the change environment (Guha et al., 1997). Business process reengineering success is facilitated with open communication. Successful business process change projects, in which IT frequently plays a change agent role, establish an objective and unbiased team or individual that continues to push the organization and line functions to find new innovative processes. An important ingredient is an atmosphere of open communication, participation, and cross training. In a study of business process reengineering projects,

four of the top five most severe implementation problems concerned change management, such as communicating, organizational politics, and commitment to new values (Grover et al., 1995).

How does an organization insure that the factors critical to the success of IT implementations are nurtured? The organizational development (OD) discipline offers specific programs for effective change interventions (Castle and Sir, 2001; Cummings and Huse, 1989). Organization development is the planned process of developing an organization to be more effective in accomplishing its goals. It focuses on developing the structures and systems within the organization, with primary emphasis on human resources, to improve organizational effectiveness. The planned change approach is influenced by Lewin's theory of change (Lewin, 1951). Lewin's theory suggests three sequential phases of the change process: unfreezing, moving, and refreezing. The first stage, unfreezing, creates a climate for change. The moving stage involves analysis, design, and installation. The final stage, refreezing, institutionalizes the change. Researchers have found that successful projects tend to conform more closely to the prescriptions of the Lewin model (Grover et al., 1995). One of the underlying principles of the planned change model is the sharing and communication of information about the change (Cummings and Huse, 1989). Change management is the process of reducing resistance to the change and increasing support/commitment for it, whether that be a change in process, structure, technology, reward systems, management practice, or culture (Castle and Sir, 2001).

Major change occurs when people perceive a significant departure from their expectations about issues or events in which they are invested. The change load that is required in organizations that adopt e-business is quite overwhelming. Losses in productivity, quality, profits and profitability—and in terms of employees—are becoming prohibitively high. Most people find it uncomfortable to face situations filled with ambiguity because of the loss of predictability. On the other hand, people are attracted to situations that are familiar because they allow the feeling of being in control. But people don't have to like the change; they simply need to accept the change. Resistance to change is normal and should always be anticipated as a natural human behavior. However, with decreasing trust in the workplace and declining leadership credibility, the work of communicating change is becoming increasingly difficult and challenging (Baron, 1999).

### 2.3. Framework for assessing the impact of change management on IT investment payoff

Management of organizational change entails an assessment of the preferences and expectations of the affected parties. Meeting or altering such expectations becomes critical to the change process. Initiatives to promote revision of preferences, communication of new expectations, and activities to reduce resistance to change are complementary investments that can lead to organizational change. The resulting measurement of IT payoff thus achieved can be attributed, at least in part, to the complimentary investment in change management.

Fig. 1 shows our framework for assessing the impact of change management initiatives on payoff from IT investments. Creating and fostering change agents, involving users in the process, and providing communication and feedback regarding the change are change management activities that we propose contribute to organizational change. These change management techniques lead to reduced resistance to change and initiation of activities to stimulate change as well as sustain the change momentum. These organizational changes facilitate the implementation process, contributing to the IT projects' payoff, which can be measured in terms of improved computing capabilities, increased productivity, and reduced cost. It is expected that discernible payoff following change management techniques can reduce implementation time and cost, and increase user satisfaction not only with the implementation process but the final information system.

In the following case study, we apply this framework to a global organization's IT investment in upgrading the operating systems of all their workstations to Microsoft's Windows 2000 (Win2K). The workstations were critical to the employees' ability to partner with

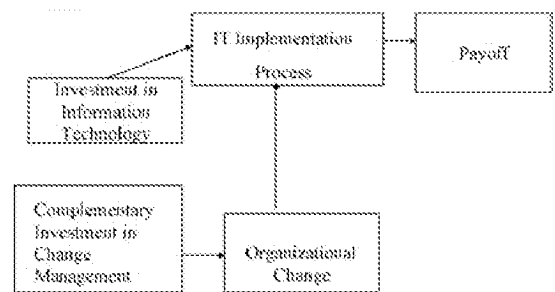


Fig. 1. Impact of change management on IT investment payoff.

their customers in the e-business environment. Upgrading these workstations constituted a major change for this organization because it disrupted the activities of all its employees. While the Win2K upgrade did not change the company's business processes, it did significantly affect individual productivity. If the upgrade did not occur smoothly, significant productivity loss could occur. In addition, this upgrade marked the first time that employees were mandated to use a proprietary system, which was a significant cultural change for this company. Thus, study of this IT investment and the organizational change initiatives that were used will provide insights into the IT payoff black box.

### 3. Case Study Background

Cisco Systems, Inc is the worldwide leader in networking for the Internet. Cisco's Internet Protocol-based (IP) networking solutions are the foundation of the Internet and most corporate, education, and government networks around the world. Cisco provides the broadest line of solutions for transporting data, voice and video within buildings, across campuses, or around the world. Headquartered in San Jose, California, Cisco also has major operations around the world ([www.cisco.com](http://www.cisco.com)). Cisco's CEO, John Chambers, points to two key reasons for Cisco's enormous success—(i) the use of the

Internet and technology within the company and (ii) Information Technology (IT) partnering with businesses to ensure that technology is used efficiently.

In August 2000 Cisco began considering standardization of its desktop operating system software in order to integrate internal communications among 48,000 employees in more than 100 countries around the world. Upgrading and standardizing all PCs and encouraging both PC and Unix users to move to Windows 2000 posed significant challenges as there were issues of stability and reliability in the current environment. The operating system upgrade posed a change risk for Cisco because if not managed properly, it had the potential for negative impacts on customer service, employee satisfaction and systems reliability.

### 4. Measuring the Impact of Change Management Initiatives on IT Payoff

In this section we describe how we analyzed the impact of change management activities on payoff for the Win2K upgrade. We used the framework introduced in Section 2 to guide our analysis. Metrics used to assess each of the components of the framework are summarized in Table 1 and described in the sections below. IT investment metrics include deployment quantities and costs. The IT implementation process is measured by time and cost of upgrade and client support

*Table 1. Metrics for measuring the impact of OCM's activities for deployment of Win2K at Cisco*

IT investment	IT implementation process	Investment in change management	Organizational change	Payoff
Deployment data: Number and type of workstations upgraded and refreshed	Time to upgrade	Number and type of change initiatives implemented	Number of inquiries during upgrade process	Satisfaction with system and migration process
Deployment \$	Cost to upgrade	Training and facilitation hours spent by OCM (FTEs, labor \$)	Usage of scheduling tools	Revenue, profitability, productivity statistics
	Support		Response to targeted communications	Reduction in number and duration of support calls with new operating system
			Changes in user expectations and resistance to change	Reduction in cost and time to implement all upgrades and time to upgrade each computer (client downtime)
				Increase in stability and functionality of operating system

during the upgrade. Change management investment initiatives include the number and types of changes and the costs of facilitating these initiatives by OCM. Each of these initiatives can facilitate organizational change, which contributes to payoff. Metrics for organizational change and payoff are listed in the last two columns of the table.

#### 4.1. The IT investment

The adoption of Windows 2000 as the operating system standard at Cisco required upgrade of more than 34,000 computer systems at 300 locations in 117 countries. The total budgeted cost was estimated to be \$18.6 Million or \$529/computer. In addition, the upgrade was determined to be complex due to the variety of ways in which a computer could be upgraded.

Clients (computer users) whose lease had expired or whose equipment was more than two years old would receive new laptops to insure all users met the basic hardware standard of 350 MHz CPU or better with 128 Mb memory. This process was called *refresh*. Other clients would have their computers rebuilt with Win2K. This process was called *UIP* (upgrade in place). During the overall project, more than 19,000 computers would be UIP (upgrade in place) and more than 12,000 computers would be refreshed or supplied to new hires. The technicians conducted some upgrades, while others were self-initiated by clients.

#### 4.2. IT implementation

The overall project lasted 9 months. Installation began in September 2000 with a pilot upgrade of 3150 computers. The core deployment process ran from January to April 2001 and during those four months, Windows 2000 was installed on 24,000 systems at 270 locations in 100 countries. The deployment schedule is shown in Fig. 2.

Deployment was accomplished using:

- Fixed Deployment Depots for large campuses (up to 600 machines per day).
- Roaming Depots (Depots in a Box) for smaller sites and sales offices.
- Home Systems brought to UIP Depot.
- Mail in Depots for mobile users and telecommuters.
- Client Self-Installations—Reserved for high tech clients; web-initiated.

The deployment process used in each of these cases involved the following steps:

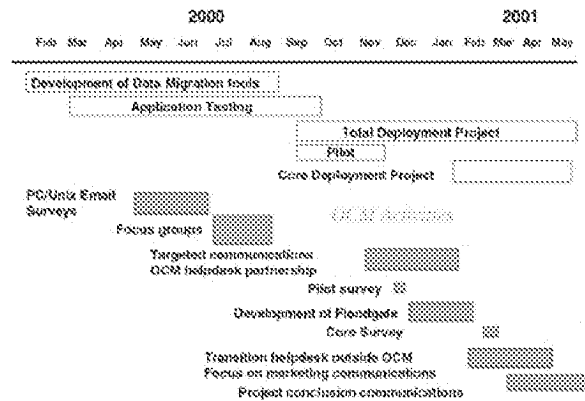


Fig. 2. Windows 2000 deployment activities and schedule.

1. Copying all user data such as internet favorites and client “personality” settings such as display preferences to a server
2. Installing hardware specific software
3. System naming and adherence to local security policies
4. Migrating data from old laptop
5. Language customization
6. Application installation and restoration
7. License tracking
8. Restoration of system settings and transfer of local email.
9. “Day-after” support

The process was completed within 4 hours. Technicians trained on the use of the tools performed the work. Project Managers monitored the effort and ensured the highest level of quality measured in terms of technical accuracy and client satisfaction. For mail-in depots, special shipping arrangements with FedEx allowed for only weekend down time.

#### 4.3. Change management initiatives

The Windows 2000 deployment project was facilitated by the Organizational Change Management Group (OCM), which was formed in June 2000. Headed by a Senior Manager of Change Management, the group grew to 14 employees within one year. OCM consisted of IT communication and organizational change management specialists. The mission of OCM was to implement solutions to make business strategies happen through people. The objectives were to increase productivity by creating a collaborative environment, improve client communication and perceptions of

IT, increase cross-functional communication, expand leadership capability, move IT to strategic business partner, and provide change management and communication consulting.

Given the challenges in moving to open standards in the Cisco environment, employee resistance was inevitable. Positive sponsorship was critical to plan and implement the change and OCM worked to help create internal sponsors for the change. OCM determined and instituted the best methods for keeping all clients current on deployment plans. Effective communication strategies were important to impact people's decisions and behaviors. It was critical to provide people with ongoing information. Since individual employees initiated registration for Windows 2000 upgrades, the company had to foster an environment to encourage them to do so. If the upgrade process took too long or was too inconvenient, individuals would not be inclined to volunteer to participate. This would increase the implementation time. Communications had to be timely, accurate, simple, and credible, relevant to each stakeholder's own situation, and available through different communication channels. OCM provided quick feedback mechanisms for clients and kept all support groups informed.

As shown in Fig. 2, OCM conducted two email surveys with PC and Unix clients to understand client usage, needs and concerns. A total of 2177 Unix clients and 10,252 PC clients responded to the surveys. PC users were generally satisfied with Microsoft OS and Office products. Unix users favored maintaining an open standards policy including continued support of the Linux platform. It was clear that whatever application was chosen, it would lead to some discontent. Clients also had different preferences for the conversion. While most clients were open to administering the upgrade themselves, about one-third of PC users preferred conversion by the IT department.

The information gathered from these surveys guided a series of 25 global focus group interviews to conduct in-depth analyses of client opinions. Three audiences were involved: PC only users, Unix only users, and Dual system users. Focus groups were held in a total of 11 locations in nine countries with a total of 174 Cisco participants. The debate about open vs. proprietary standards focused on the Cisco culture, which fostered the concept of empowerment—freedom of choice. For Unix users, freedom of choice meant choosing the “right” application tool for the computing job. PC users were content to allow a proprietary system to

make selection choices for them, because it increased their freedom to get the job done in ways they deemed most effective, and for them an open standard environment was inefficient. Focus group participants felt that the method and location of how Windows 2000 was deployed should be the choice of the user. Offering clients multiple ways to do their jobs was an essential and valued part of Cisco culture. Some clients did not want the IT department to handle the installations. Capabilities for classroom lessons or tutorials were required for self upgrades.

The information gained from the surveys and interviews was used to structure the implementation process. Key elements of the Cisco culture guided the process: (1) clients could not live without their laptop; (2) policies, procedures, services and support were web enabled, and (3) strong focus on client satisfaction. The IT strategy was to reduce cost of support and deployment, minimize client down time and deployment time, increase functionality with Win2K, and increase stability of the laptop.

OCM implemented pilot studies in order to gain commitment and internalize champions and advocates, and improve communication. Input from surveys administered to these participants after the pilot implementation was used to refine the process and create key messages to encourage clients to upgrade their systems.

OCM established a partnership with the Helpdesk/Global Technical Response Center to coordinate Windows 2000 messages. They also implemented an online Windows 2000 registration tool (Floodgate) making it easier for clients to determine what was required for their own deployments. Floodgate automatically determined a client's eligibility for “Refresh” or “Upgrade in place”, allowing the client to arrange the upgrade around his or her schedule, enabling centralized registration tracking, and providing efficient communication.

OCM responded to over 3,000 asset management inquiries. Feedback mechanisms were revised through the process. For example, in the 3rd quarter they instituted a different web based email client to better coordinate responses to inquiries. Once this was accomplished, OCM was able to transition client response activities to external resources and focus more on marketing communications.

The focus groups and surveys provided input to OCM and Cisco regarding different stakeholder's issues and motivations. This information enabled OCM to develop targeted communications throughout the

deployment process. These communications encouraged employees to participate in the Windows 2000 upgrade. Communication channels included announcements from managers, meetings, flyers, web site case studies, email aliases, and web sites encouraging feedback and questions. OCM was very sensitive to communication messages and their impact on clients. During second quarter of the rollout, OCM recognized that some senior managers were sending conflicting messages to their staff and took action to rectify this problem.

OCM helped conclude the project by conducting a communication program around "no support of Win 95 starting in May". Senior management announcements, posters, and flyers supported this program. OCM also managed communications around a program to re-deploy surplus equipment or return it to leasing agents for credit. The IT department also developed a virtual store to resell items returned via building sweeps and mail-in campaigns. This enabled them to successfully complete the project.

Table 2 summarizes all the specific change management initiatives made by OCM to accompany the upgrade. It summarizes the organizational changes resulting from these initiatives, which are described in greater detail in the next section. For example, the announcements and communications increased client participation with fewer problems, which reduced implementation time and costs. The surveys and focus groups changed opinions regarding the importance of

standards, increasing willingness to adopt the standards and upgrade. This not only increased client willingness to use standard systems but also reduced implementation time and cost.

#### 4.4. Organizational change

OCM initiated the surveys and focus groups to understand which system(s) clients preferred and why; gauge client reaction to proposed changes and scenarios; determine how clients preferred to be trained on changes and upgrades; and understand client needs and preferences. Prior to participation in the focus groups, two thirds of the participants felt that an open system was best for Cisco. At the focus group sessions, all participants viewed a video explaining the different options. After viewing the video, some participants changed their opinions and all had the opportunity to learn more about available options. This reassured the clients that their opinions were considered. They felt that Cisco was interested in their preferences, options, and job satisfaction and was willing to include them in decision-making and as a result, they were more willing to participate. They understood the case for new technology and were more willing to adapt and use it. There were expressions of appreciation that the IT department was soliciting and listening to the opinions of its employees through meetings such as the focus groups. Thus, the surveys and focus groups led to more positive opinions regarding the standards and increased willingness to adopt.

Table 2. Proposed impact of change management initiatives on organizational change and IT payoff

Change management initiative	Organizational change	Impact on IT payoff
Create internal sponsors	More acceptance of change	Enhanced impact of IT assets Reduced implementation time
Communication (announcements, case studies, web sites) to impact decisions and behaviors	Increased participation Fewer implementation problems	Lower implementation costs Reduced implementation time
Email surveys and focus groups	More positive opinions regarding importance of standards Increased willingness to adopt	Enhanced use of upgraded systems Reduced implementation time/cost
Pilot studies and client satisfaction surveys	Changes to implementation process Development of sponsors	Increased client satisfaction
Providing feedback to clients through web sites	Changes to implementation process	Reduced implementation time
Help desk partnership	More acceptance of change	Increased client satisfaction
Scheduling application	Increased registration	Reduced implementation time Increased client satisfaction
Communications targeted to project completion	More participation	Reduced time to complete project



The pilot studies not only provided information about how best to accomplish the upgrades, it also helped create advocates and sponsors. Along with client satisfaction surveys and web site communications, input was received and used to change the upgrade process to make it more efficient and effective. The Help Desk partnership led to greater acceptance of change.

The targeted communications, along with the web-based tools that were instituted to support questions, caused people to question and learn about the implementation process. OCM found that hand holding was an important part of the Cisco culture. More than 20% of clients who upgraded in place required further clarification on the process prior to registering for their upgrade. Between November and February, they received almost 1700 inquiries. Between February and May, there were 1900 inquiries. The Floodgate scheduling tool made it easier for clients to plan for their upgrades. After Floodgate was installed, the deployment rates increased. Problem resolution was accomplished within 1–2 days. Deployment rates were dependent upon user initiation of the process. Thus, ease of use of the scheduling tool caused more clients to get problems resolved and initiate the upgrade process. Targeted communications were also important to provide impetus for the clients to begin the process. Fig. 3 shows the organizational change resulting from the release of Floodgate on January 15 as well as several major communications efforts of OCM. Directly after the release of Floodgate, the number of upgrades increased. In addition, there was a significant increase in the deployment numbers at the very end of January and through mid February. This reflects the impact of the

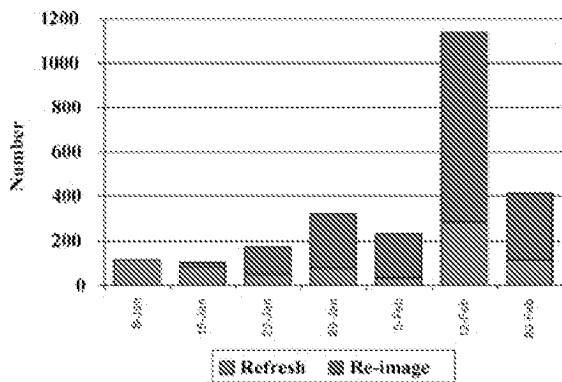


Fig. 3. Number of Windows 2000 upgrades in San Jose.

late January major announcement made by Pete Solvik, CIO & SVP, IT, regarding the deployment. Then, on 1/26/01, management emailed a high profile communication to all managers in San Jose. In addition, during that week, the internal web site highlighted the importance of this change. The large increases in the number of deployments during those weeks reflect the impact of these communications on the number of registrations for upgrades.

4.5. Payoff

There are two types of payoff associated with this project. First, there is the payoff from investment in Win2K technology itself. Second, there is the payoff from OCM’s efforts in terms of an efficient and effective implementation process.

4.5.1. Payoff from investment in Win2K technology.

Payoff from deploying Windows 2000 to all users includes improved communication capabilities and lower costs. Payoff can be measured by operating cost reductions, improved client satisfaction, and cost of implementation.

Total cost of computer ownership per user per year was estimated to be \$7,674 for Windows 95 versus \$4,830 for Windows 2000, a savings of \$2,844 per computer per year. The lower costs for Windows 2000 reflects reduced costs for personalization and account creation which were automated for Windows 2000, decrease in cost due to extended lease periods, and decrease in support calls due to greater stability of Win2K. It was estimated that there would be a savings of 1000 calls/month for every 5000 users with Win2K due to its increased stability.

While it is difficult to measure improved communication due to the standardized operating system, it is possible to gauge its contribution through client satisfaction. Satisfaction with Win2K was measured at two points during the implementation process through surveys, one directly after the pilot and one during the main implementation. Average response to “I am pleased with the Windows 2000 operating system” was 4.18 after the pilot (277 respondents) and 4.02 after upgrades from Nov 2000 through February 14, 2001 in San Jose and Americas (872 respondents) on a five point scale with 5 = strongly agree. Prior to the implementation of Win2K, less than one half of Windows 95 users were satisfied with their operating system.

The total global labor and equipment costs for 16,393 windows upgrades and 7830 IBM refresh (core



deployment) was \$12.8 million or \$529 per computer. Total project costs were \$5.8 million under budget. In fact, the total global cost, including Asia Pacific and Europe, Middle East, and Asia, was less than the budgeted cost for the US and Americas alone. It is expected that these lower costs were enabled by the organizational change resulting from the change management initiatives instituted by the Organizational Change Management group.

**4.5.2. Organizational change management's contribution to payoff.** OCM's role in increasing payoff to Cisco was to maximize the positive client experience during the deployment so as to improve clients' perceptions about the outcome (use of Win2K) and to decrease operating costs by contributing to a more efficient implementation process. Their stated objectives were to reduce the cost of support and deployment, minimize client down time and deployment time, increase functionality with Win2K and increase stability of the laptop. To accomplish this, they provided convenient scheduling, minimized time the clients were without PCs, increased system stability and functionality, supported flexible security, and preserved clients' applications and data settings. Their activities insured that all employees updated their computers in a timely manner so that full benefits could be realized and implementation time and cost minimized. With many clients initially resisting this change, a stalled or longer installation could have resulted in higher costs of implementation, greater resources to support users, and disruption of business activity. OCM's activities enabled the core deployment to be completed within 4 months and total project within 9 months, contributing to the ability to complete this project more than 30% under budget. Table 2 summarizes the impact of organizational change resulting from specific change management initiatives on IT payoff. For example, increased client participation and initiation of upgrades led to reduced implementation time. More positive opinions regarding the importance of standards led to enhanced use of upgraded systems.

Although we were not able to collect specific data to support our proposition, we believe that both the web-based registration tool and the web sites enabling customer feedback contributed to the short deployment time (four hours). With Floodgate, the web based registration tool, asset reconciliation and upgrade were accomplished in a relatively short time period. Problems were typically resolved within 1–2 days. The web based

Table 3. Client satisfaction with deployment process

Item description	Core*	Pilot**
Overall, I feel that the Windows 2000 migration process was successful	4.02***	4.37
I found the overall migration process convenient	3.59	3.96
My data migrated successfully	3.98	4.16
My data migrated correctly and I was able to locate files easily	3.80	3.99
The Depot/Refresh process was completed in a reasonable amount of time	3.73	3.90
I found the IBM technicians satisfactory in their responsiveness	3.97	4.21
I found the IBM technicians satisfactory in the quality of their work	3.97	4.21
I am pleased with the Windows 2000 operating system	4.02	4.18

\*Core survey administered to individuals receiving upgrade from November 2000 through February 14, 2001; 872 respondents.

\*\*Pilot administered to 613 users; 277 respondents.

\*\*\*5 point scale, 5 = agree strongly.

tools for providing feedback and responding to questions also enabled quick problem resolution. This led to less downtime and loss of productivity. The OCM group was able to facilitate the resolution of problems generally within 2–3 business days.

Client satisfaction with the migration process is also a useful metric of the impact of OCM's efforts. Client satisfaction results are shown in Table 3. Overall clients were very pleased with the migration process. This was due to the efforts of having dedicated change communication experts on this initiative. Even though clients were initially resistant, they were offered an opportunity to voice their opinions and be heard. OCM then used focus groups to develop advocates for change. Client expectations were managed throughout the process. Effective communication strategies kept clients apprised of the need to initiate the deployment. The deployment tools insured an efficient process while enabling some hand holding of clients. The resulting client satisfaction metrics reflect these efforts.

## 5. Conclusions, Limitations and Future Research

### 5.1. Conclusions

Through this case study we have demonstrated the need for examining change management initiatives to facilitate IT investment and implementation. In doing so,

we drew upon the literature that suggests that effective implementation and change management is a requirement for successful information systems implementation. With the OCM, targeted initiatives were launched to facilitate IT investment in the operating system upgrade. Our findings show that management of change played a significant role in planning, organizing, communicating and executing the corporate wide upgrade of the workstation operating system at Cisco. Data collected at various stages before and during the IT implementation indicate that investing in planning of IT-related change can improve client satisfaction and reduce the likelihood of resistance from those affected by the change.

This case study contributes to the IT payoff field in the following ways. First, it stages organizational change management as a complementary investment in change and a facilitator of IT payoff. Second, by utilizing the process approach to establish a link between IT investment and the payoff, this study identifies the intermediate steps that lead to payoff. Third, it establishes the metrics required for assessing the effectiveness of change management in contributing to organizational change and subsequently payoff from the IT investment.

### 5.2. Limitations

Due to the nature of the case study, we were limited by the level of detail in the data and metrics available for analysis. While the IT investment data were available, the metrics for how Cisco measured the success of the investment were not clear. Similarly, helpdesk data for support requests were available but due to inadequate detail, it was not possible to identify whether such support requests were due to or in spite of the operating system upgrade. Therefore an individual's request for support could not be related directly to their stage in the change process. Further, attitudinal data of participants during the change process such as resistance to change and attitude towards project as a function of change management activities were unavailable. As is the case with most studies that examine complementary investments and organizational change, it is difficult to isolate the effects of the change management process from the rest of the activities affecting the IT investment. However, the fact that the project was accomplished under budget and ahead of schedule with satisfied users is an indication of the unusual success of the managed change project.

### 5.3. Future research

Future research can design and execute empirical studies using metrics of organizational change and payoff. Change management combined with project implementation management can ensure that resources are applied to assist in accomplishing IT objectives. We outline several areas for future research resulting from the above-mentioned limitations of this study.

First, process level data should be gathered so that the process of IT investment and payoff can be tracked. In doing so, the impact of specific change management initiatives on organizational performance can be measured, while controlling for other initiatives. Second, metrics need to be developed and captured so that the intensity of change management can be assessed. This will answer questions such as: What constitutes change? What type of change requires a change management process? By tracking implementation data, the organization can determine appropriate training needs for certain users.

Future studies can examine which communication modes are suitable for different IT projects. Future research can also gather additional attitudinal data such as resistance to change and attitude towards project after specific change management initiatives by: (i) Surveying employees involved to measure the effectiveness of each step in the change process and (ii) Performing controlled experimentation by comparing projects with and without change management initiatives. This can be accomplished by choosing sites within a company that are subject to different types of OCM interventions, perhaps at different times. These suggestions for future research will further the examination of the role of change management in IT investment, particularly in e-business environments, where managed organizational change can assist as a facilitator of IT payoff.

### References

- Bannister F. Dismantling the silos: Extracting new value from IT investments in public administration. *Information Systems Journal* 2001;11(1):65–84.
- Baron A. Communicating at the speed of change. *Strategic Communication Management* 1999;(Oct./Nov.):12–17.
- Baronas AM, Louis R. Restoring a sense of control during implementation: How user involvement leads to system acceptance. *MIS Quarterly* 1988;12(1):111–123.
- Baroudi J, Olson M, Ives B. An empirical study of the impact of user involvement on system usage and information satisfaction. *Communications of the ACM* 1986;29(3):232–238.

- Barua A, Kriebel CH, Mukhopadhyay T. Information technologies and business value—an analytic and empirical investigation. *Information Systems Research* 1995;6(1):3–23.
- Barua A, Lee CHS, Whinston AB. The calculus of reengineering. *Information Systems Research* 1996;7(4):409–428.
- Barua A, Mukhopadhyay T. Information technology and business performance: Past, present, and future. In: Zmud RW, ed. *Framing the Domains of IT Research: Projecting the Future Through the Past*, Cincinnati, OH: Pinnaflex Educational Resources, 2000:65–84.
- Bell M, Harrison D, McLaughlin M. Forming, changing, and acting on attitude toward affirmative action programs in employment: A theory driven approach. *Journal of Applied Psychology* 2000;85(5):784–796.
- Boehm B. A spiral model of software development and enhancement. *IEEE Computer* 1988:61–72.
- Brynjolfsson E. The productivity paradox of information technology. *Communications of the ACM* 1993;36(12):66–77.
- Brynjolfsson E, Hitt LM. Beyond computation: Information technology, organizational transformation and business performance. *Journal of Economic Perspectives* 2000;14(4):23–48.
- Byrd TA, Marshall TE. Relating information technology investment to organizational performance: A causal model analysis. *Omega-International Journal of Management Science* 1997;25(1):43–56.
- Castle D, Sir M. Organization development: A framework for successful information technology assimilation. *Organization Development Journal* 2001;19(1):59–72.
- Chan YE. IT value: The great divide between qualitative and quantitative and individual and organizational measures. *Journal of Management Information Systems* 2000;16(4):225–261.
- Cobb A, Folger R, Wooten K. The role justice plays in organizational change. *PAQ* 1995:135–151.
- Coffee P. E-CRM: Making the customer king? *eWeek* 2001;18(20):39.
- Cummings TC, Huse EF. *Organizational Development and Change*. New York: West Publishing, 1989.
- Davern MJ, Kauffman RJ. Discovering potential and realizing value from information technology investments. *Journal of Management Information Systems* 2000;16(4):121–143.
- Debrabander B, Edstrom A. Successful information systems development projects. *Management Science* 1977;24(2):191–199.
- Devaraj S, Kohli R. Information technology payoff in the healthcare industry: A longitudinal study. *Journal of Management Information Systems* 2000;16(4):41–67.
- Dewan S, Min CK. The substitution of information technology for other factors of production: A firm level analysis. *Management Science* 1997;43(12):1660–1675.
- Fryer B. The ROI challenge. *CFO* 1999:85–90.
- Ginzberg M. Early diagnosis of MIS implementation failure: Promising results and unanswered questions. *Management Science* 1981;27(2):459–478.
- Grover V, Jeong SR, Kettinger W, Teng J. The implementation of business process reengineering. *Journal of Management Information Systems* 1995;12(1):109–144.
- Grover V, Teng J, Segars A, Fiedler K. The influence of information technology diffusion and business process change on perceived productivity: The IS executive's perspective. *Information & Management* 1998;34(3):141–159.
- Guha S, Grover V, Kettinger W, Teng James TC. Business process change and organizational performance: Exploring an antecedent model. *Journal of Management Information Systems* 1997;14(1):119–154.
- Harker PT. *The Service Productivity and Quality Challenge*. Dordrecht, Boston: Kluwer Academic Publishers, 1995.
- Hitt LM, Brynjolfsson E. Productivity, business profitability, and consumer surplus: Three different measures of information technology value. *MIS Quarterly* 1996;20(2):121–142.
- Ives B, Olson MH. User involvement and MIS success: A review of research. *Management Science* 1984;30(5):586–603.
- Kohli R, Devaraj S. Contribution of decision support systems to organizational performance: Evidence from a longitudinal study. *Decision Support Systems* 2003 (forthcoming).
- Kohli R, Devaraj S. Measuring information technology payoff: A meta-analysis of structural variables in firm level empirical research. *Information Systems Research* 2003;14(2):127–145.
- Kohli R, Piontek F, Ellington T, VanOsdol T, Shepard M, Brazel G. Managing customer relationships through an e-business decision support application: A case of hospital physician collaboration. *Decision Support Systems* 2001;32(2):171–187.
- Lewin K. *Field Theory in Social Science*. New York: Harper and Row, 1951.
- Lippitt GL. *Organization Renewal: A Holistic Approach to Organization Development*, Englewood Cliffs, NJ: Prentice-Hall, 1982.
- Lippitt GL, This LE, Bidwell RG. *Optimizing Human Resources; Readings in Individual and Organization Development*. Reading, Mass: Addison-Wesley Pub. Co., 1971.
- Lucas H. *Implementation: The Key to Successful Information Systems*. New York: McGraw Hill, 1981.
- Lucas H, Ginzberg M, Schultz, R. *Information Systems Implementation*. Norwood, NJ: Ablex Publishing Corporation, 1990.
- Mahmood M, Mann GJ. How information technology investments affect organizational productivity and performance: A longitudinal study. In: *Proceedings of the 1997 Information Resources Management Association International Conference*, 1997:187–191.
- Mooney JG, Gurbaxani V, Kraemer KL. A process oriented framework for assessing the business value of information technology (Reprinted from *Proceedings of the Sixteenth Annual International Conference on Information Systems*, 1995:17–27), *Data Base For Advances in Information Systems* 1996;27(2):68–81.
- Mukhopadhyay T, Kekre S, Kalathur S. Business value of information technology—A study of electronic data interchange. *MIS Quarterly* 1995;19(2):137–156.
- Mukhopadhyay T, Lerch FJ, Mangal V. Assessing the impact of information technology on labor productivity: A field study. *Decision Support Systems* 1997;19(2):109–122.
- Mumford E, Henshall D. *A Participative Approach to Computer Systems Design*. London: Associated Business Press, 1979.
- Powell TC, DentMicallef A. Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic Management Journal* 1997;18(5):375–405.
- Sarker S. IT-enabled organizational transformation: A case study of BPR failure at TELECO. *Journal of Strategic Information Systems* 1999;8(1):83–103.
- Strassmann PA. *Information Payoff: The Transformation of Work in the Electronic Age*. New York, London: Free Press; Collier Macmillan, 1985.

Wanberg C, Banas J. Predictors and outcomes of openness to changes in reorganizing workplace. *Journal of Applied Psychology* 2000;85(1):132–142.

Weill P. The relationship between investment in information technology and firm performance: A study of the valve manufacturing sector. *Information Systems Research* 1992;3(4):307–333.

*Susan A. Sherer* is the Kenan Professor of Information Technology Management and Program Director of Information Systems at Lehigh University. Sherer received a Ph.D. in decision sciences from the Wharton School of the University of Pennsylvania, M.S. in operations research from University of Pennsylvania, M.S. in industrial engineering from State University of New York at Buffalo, and B.S. in mathematics from State University of New York at Albany. Prior to moving into academia, Dr. Sherer managed projects for several manufacturing companies including Leeds & Northrup Company and Union Carbide Corporation. Sherer's research interests include software failure risk, managing information systems risks, inter-organizational information systems, and IT benefit justification. Sherer is the author of *Software Failure Risk: Measurement and Management* (Plenum Press, 1992), as well as numerous articles that have appeared in *Journal of Systems and Software*, *Software Maintenance*, *Software Engineering Journal*, *IEEE Software*, *Information and Management*, *Journal of Information Systems*, *International Journal of Electronic Commerce*, *Communications of AIS*, and *Journal of Electronic Commerce Research*.

*Rajiv Kohli* is an assistant professor in the Mendoza College of Business at the University of Notre Dame. He was recently an internal Consultant and Project Leader—Decision Support Services at the corporate office of Trinity Health in South Bend. Dr. Kohli received his PhD from the University of Maryland, Baltimore County. He has taught at Lehigh University, University of Maryland College Park, and University of Maryland University College where he was awarded the Teaching Recognition Award. Dr. Kohli has worked and consulted with MCI Telecommunications, Westinghouse Electronics, and Rohbe Corporation in addition to several healthcare organizations.

Dr. Kohli's research is published or forthcoming in *Information Systems Research*, *Communications of the ACM*, *Journal of Management Information Systems*, *Decision Support Systems*, and *Information & Management* among other journals. He is also a co-author of the book *The IT Payoff: Measuring the Business Value of Information Technology Investments* (Financial Times Prentice Hall, 2002). Dr. Kohli's research interests include Organizational Impacts of Information Systems, Process Innovation, and Enhanced Decision Support Systems.

*Ayelet Baron* is an expert in global business strategy and organizational change management. In her current role at Cisco Systems, Inc., she is responsible for facilitating the Worldwide Sales organization's strategy and business planning. Working for Cisco's CIO, she previously established and led the Organizational Change Management department at Cisco's IT, where she was responsible for key change initiatives ranging from an IT portal to moving IT from order takers to trusted advisors and business partners. During her career she has built leading edge teams, worked in diverse market segments and developed a reputation as a highly creative change-agent. Prior to Cisco, Ayelet spent 16 years as a consultant managing the development, implementation and measurement of key initiatives and programs for clients embarking on major change initiatives including mergers and acquisitions, technology implementation, new leadership, cost reduction initiatives, and organizational realignments for global Fortune 500 companies. She is a recognized industry leader and speaker on change management, strategic communication planning, new technologies and business strategy. She was on the executive board of the Strategic Leadership Forum, International Director-at Large for the International Association of Business Communicators (IABC) and past president, Toronto chapter, IABC. Her articles are published in *Communication World*, *Strategic Communication Management* and *Across the Board*. She is quoted in *HR Executive*, *Journal of Employee Communication Management* and *Communication World*. She is currently working on a book about how to implement effective business strategies in today's changing world.