Case 4–1

Cisco Systems, Inc.: Implementing ERP[1]

Pete Solvik, Cisco Systems' chief information officer (CIO), considered the last remaining line item of his enterprise resource planning (ERP) implementation budget. Cisco had a history of rewarding performance with cash bonuses, but the amount allocated for rewarding the ERP team, over $200,000, was unprecedented. To be sure, they had delivered a lot in a time frame that no one had believed possible. It had not been easy, either. The team members, Solvik included, had taken a risk in joining the project. Rewards should, and would, be generous. The size of the bonus pool, though, made Solvik think: They had done well, but how well? What had gone right? What had gone wrong? Given another project of this magnitude and risk, would they be able to do it again?

History of Cisco

Cisco Systems, Inc., was founded by two Stanford computer scientists in 1984 and became publicly traded in 1990. The company's primary product is the "router," the combination of hardware and software that acts as a traffic cop on the complex TCP/IP[2] networks that make up the Internet (as well as corporate Intranets). With the rise of Internet technologies, demand for Cisco's products boomed and the company soon began to dominate its markets. By 1997, its first year on the Fortune 500, Cisco ranked among the top five companies in return on revenues and return on assets. (See Exhibit 1 for Cisco's financial performance.) Only two other companies—Intel and Microsoft—have ever matched that feat. Perhaps even more impressive, on July 17, 1998, just 14 years after being founded, Cisco saw its market capitalization pass the $100 billion mark (15 times 1997 sales). Some industry pundits predicted that Cisco would be the third dominant company—joining Microsoft and Intel—to shape the digital revolution.

Don Valentine, partner of Sequoia Capital and vice chairman of the board of Cisco,[3] was the first to invest in Cisco; he took a chance on the young company when other venture capitalists were more cautious. One way Valentine protected his $2.5 million initial investment was by reserving the right to bring in professional management when he deemed it appropriate.

In 1988 Valentine hired John Morgridge as chief executive officer (CEO). Morgridge, an experienced executive in the computer industry, immediately began to build a professional management team. That team soon clashed with the founders, and after Cisco's initial public offering in 1990, both founders sold all their stock and left the company. That departure left Morgridge free to continue his plans to install an extremely disciplined management structure.

Morgridge believed that many Silicon Valley firms decentralized too quickly and did not

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[2]Transmission Control Protocol and Internet Protocol (TCP/IP) provided a robust standard for routing messages between local area networks (LANs) and created the potential to connect all computers on an ever-larger wide area network (WAN).

[3]Valentine was previously the outside executive chairman of the board of Cisco. Cisco has maintained its chairman of the board as an outside director. Currently, John Morgridge serves as an outside director and chairman of the board.

EXHIBIT 1 Financials and Other Cisco Statistics

Years Ended	July 25, 1998	July 26, 1997	July 28, 1996	July 30, 1995
Net sales	$8,458,777,000	$6,440,171,000	$4,096,007,000	$2,232,652,000
Income before provisions for income taxes	$2,302,466,000	$1,888,872,000	$1,464,825,000	$737,977,000
Net income[a,b,c]	$1,350,072,000	$1,048,679,000	$913,324,000	$456,489,000
Net income per common share (diluted)[d]	$0.84	$0.68	$0.61	$0.32
Shares used in per share calculation (diluted)	1,608,173,000	1,551,039,000	1,490,078,000	1,425,247,000
Total assets	$8,916,705,000	$5,451,984,000	$3,630,232,000	$1,991,949,000
Stock price the Friday before fiscal year end[e]	$65.167	$35.417	$22.833	$12.458
Number of employees[f]	15,000	11,000	8,782	4,086
Net sales per employee	$563,918	$585,470	$466,409	$546,415
Net income per employee	$90,005	$95,334	$103,999	$111,720

[a]Net income and net income per share in 1998 include purchased research and development expenses of $94 million and realized gains on the sale of a minority stock investment of $5 million. Pro forma net income and diluted net income per share, excluding these nonrecurring items net of tax, would have been $1,878,988,000 and $1.17, respectively.
[b]In 1997, net income and net income per share include purchased R&D expenses of $508 million and realized gains on the sale of a minority stock investment of $153 million. Pro forma net income and diluted net income per share, excluding these nonrecurring items net of tax, would have been $1,413,893,000 and $0.91, respectively.
[c]In 1995, net income and net income per share include purchased R&D expenses of $96 million. Pro forma net income and diluted net income per share, excluding these nonrecurring items net of tax, would have been $515,723,000 and $0.36, respectively.
[d]Reflects the three-for-two stock split effective September 1998.
[e]Stock prices reflect a two-for-one split effective February 1996, a three-for-two split effective November 1997, and a three-for-two split effective September 1998.
[f]Number of employees was taken from the respective 10-K forms.
Source: 1998 annual report and 1998 10-K form.

appreciate the proven ability of the functional organization to grow without sacrificing control. Accordingly, Morgridge maintained a centralized functional organization. While product marketing and research and development (R&D) were decentralized into three "lines of business" (enterprise, small/medium business, and service provider), the manufacturing, customer support, finance, human resources, information technology (IT), and sales organizations remained centralized.

History of IT at Cisco

Pete Solvik joined Cisco in January 1993 as the company's CIO. At that time Cisco was a $500 million company running a UNIX-based software package to support its core transaction processing. The functional areas supported by the package included financial, manufacturing, and order entry systems. Cisco was "far and away" the biggest customer of the software vendor that supported the application.[4] Solvik's experience and the company's significant growth prospects convinced him that Cisco needed a change:

> We wanted to grow to $5 billion-plus. The application didn't provide the degree of redundancy, reliability, and maintainability we needed. We weren't able to make changes to the application to meet our business needs anymore. It had become too much spaghetti, too customized. The software vendor did offer [an upgraded version], but when we looked at it, we thought, "By the time we're done our systems will be more reliable and have higher redundancy, but it will still be a package for $300 million companies and we're a $1 billion dollar company."

[4]Most customers of the software vendors ranged from $50 million to $250 million in revenue.

Solvik's initial inclination was to avoid an ERP solution. Instead, he planned to let each functional area make its own decision regarding the application and timing of its move. Keeping with Cisco's strong tradition of standardization, however, all functional areas would be required to use a common architecture and common databases. This approach was consistent with the organizational and budgetary structures Solvik had installed upon his arrival. Solvik felt strongly that budgetary decisions on IT expenditures should be made by functional areas while the IT organization reported directly to him. Solvik's objection to ERP solutions was also born out of concerns about the types of "megaprojects" ERP implementations often became.

A Defining Moment

In the following year little progress was made. Randy Pond, a director in manufacturing[5] and the eventual coleader of the project, described the dilemma facing the functional areas in late 1993:

> We knew we were in trouble if we did not do something. Anything we did would just run over the legacy systems we had in place. It turned into an effort to constantly Band-Aid our existing systems. None of us were individually going to go out and buy a package. . . . The disruption to the business for me to go to the board and say "Okay, manufacturing wants to spend $5 or $6 million to buy a package, and by the way it will take a year or more to get in" was too much to justify. None of us was going to throw out the legacies and do something big.

[5]Subsequent to the implementation Randy Pond was promoted to the vice president level in manufacturing at Cisco.

The systems replacement difficulties of functional areas perpetuated the deterioration of Cisco's legacy environment. Incremental modification continued while the company sustained an 80 percent annual growth rate. Systems outages became routine. Product shortcomings exacerbated the difficulties of recovering from outages.

Finally, in January 1994, Cisco's legacy environment failed so dramatically that the shortcomings of the existing systems could no longer be ignored. An unauthorized method for accessing the core application database—a work-around that was itself motivated by the inability of the system to perform—malfunctioned, corrupting Cisco's central database. As a result, the company was largely shut down for two days.

Cisco's struggle to recover from this major shutdown brought home the fact that the company's systems were on the brink of total failure. Solvik, Pond, and a number of other Cisco managers came to the conclusion that the autonomous approach to systems replacement they had adopted was not going to be sufficient. An alternative approach was needed. Solvik described what they did:

> We said, "We can't wait casually by while order entry, finance, and manufacturing go out and make three separate decisions." It would take too long to get those applications in place. We needed to take faster action. At that point we got sponsorship from the senior vice president of manufacturing, Carl Redfield. He was with Digital before Cisco, in PC manufacturing. He took the lead and said, "Okay, let's get on with this. . . . Let's start from the manufacturing perspective and see if we can get the order entry and financial groups in the company interested in doing a single integrated replacement of all the applications instead of taking a longer time doing separate projects." And so in February, about a month after the [company shutdown], we went about putting together a team to do an investigation to replace the application.

Redfield understood from previous large-scale implementation experiences at Digital how "monolithic" IT projects could take on lives of their own. He echoed Solvik's concerns about project size and had strong views about how Cisco should approach a large implementation project:

> I knew we wanted to do this quickly. We were not going to do a phased implementation; we would do it all at once. We were not going to allow a lot of customization either. There is a tendency in MRP systems[6] for people to want the system to mirror their method of operation instead of retraining people to do things the way the system intended them. This takes a lot longer. Also, we wanted to create a schedule that was doable and make it a priority in the company as opposed to a second tier kind of effort.

Selecting an ERP Product

Cisco's management team realized that implementing to meet *business* needs would require heavy involvement from the business community. This could not be an IT-only initiative. It was critically important to get the very best people they could find. Solvik elaborated: "Our orientation in pulling people out of their jobs [to work on the project] was that if it was easy, then we were picking the wrong people. We pulled people out that the business absolutely did not want to give up."

Consistent with the need for a strong Cisco team, the company would also need strong partners. Solvik and Redfield felt it was particularly important to work with an integration partner that could assist in both the selection and the implementation of whichever solution the company chose. Great technical skills and business knowledge were a prerequisite. Solvik explained the choice of KPMG as the integration partner:

> KPMG came in and saw an opportunity to really build a business around putting in these applications. They also saw this as kind of a defining opportunity, to work with us on this project. As opposed to some other firms that wanted to bring in a lot of "greenies," KPMG was building a practice of people that were very experienced in the industry. For instance, the program manager that they put on the job, Mark Lee, had been director of IT for a company in Texas that had put in various parts of an ERP system.

With KPMG on board, the team of about 20 people turned to the software market with a multipronged approach for identifying the best software packages. The team's strategy was to build as much knowledge as possible by leveraging the experiences of others. They asked large corporations and the "Big Six" accounting firms what they knew. They also tapped research sources such as the Gartner Group.[7] By orienting the selection process to what people were actually using and continuing to emphasize decision speed, Cisco narrowed the field to five packages within two days. After a week of evaluating the packages at a high level, the team decided on two prime candidates: Oracle and another major player in the ERP market. Pond recalled that size was an issue in the selection. "We decided that we should not put Cisco's future in the hands of a company that was significantly smaller than we were."

The team spent 10 days writing a request for proposals (RFP) to send to the vendors. The vendors were given two weeks to respond. While the vendors prepared their responses, the Cisco team continued its "due diligence" by visiting a series of reference clients offered by each vendor. After Cisco's analysis of the RFP responses, each vendor was invited in for a three-day software

[6]MRP represents a class of systems, often thought of as predecessors of ERP, that focus on planning the material requirements for production. Forecast or actual demand is fed to MRP either manually or from other types of systems. MRP functionality is embedded in the offerings of all leading ERP vendors.

[7]The Gartner Group is a leading industry resource for information on ERP and other information systems and manufacturing-related research.

demonstration and asked to show how its package could meet Cisco's information processing requirements. Cisco provided sample data, while the vendors illustrated how key requirements were met (or not met) by the software.

The selection of Oracle was based on a variety of factors. Redfield described three of the major decision points:

> First, this project was being driven pretty strongly by manufacturing, and Oracle had a better manufacturing capability than the other vendor. Second, they made a number of promises regarding the long-term development of functionality in the package.[8] The other part of it was the flexibility offered by Oracle's being close by.[9]

Cisco also had reason to believe that Oracle was particularly motivated to make the project a success. Pond provided his impression of Oracle's situation: "Oracle wanted this win badly. We ended up getting a super deal. There are, however, a lot of strings attached. We do references, allow site visits, and in general talk to many companies that are involved in making this decision." The Cisco project would be the first major implementation of a new release of the Oracle ERP product. Oracle was touting the new version as having major improvements in support of manufacturing. A successful implementation at Cisco would launch the new release on a very favorable trajectory.

From inception to final selection the Cisco team had spent 75 days. The final choice was team-based. Solvik described how the decision was made and presented to the vendors:

> The team internally made the choice and informed the vendors. There was no major process we had to go through with management to "approve" the selection. We just said, "Oracle, you won; [other vendor], you lost." Then we went on to contract negotiations with Oracle and putting a proposal together for our board of directors. The focus immediately turned to issues of how long the project would take and how much it would cost. The team decided, "Yes, we will do this and we ought to go forward with the project." So now at the very end of April we were putting the whole plan together.

Going to the Board

Before going to the board for approval, the team needed to answer two very important questions: How much would it cost? and How long would it take? They knew their executives were worried that a big project might spin out of control and deliver substandard results. Despite the risks, the team took a pragmatic approach to estimating project requirements. Solvik described the process:

> Our quarters go August to October, November to January, February to April, and May to July.[10] So right here on May 1, beginning of the fourth quarter, we are asking, "How long should it take to do a project to replace all of our core systems?" This is truly how it went. We said, "you know we can't implement in the fourth quarter. The auditors will have a complete cow." If it takes a year, we will be implementing fourth quarter, and that won't work. We thought it really should take 15 months, July or August a year later. Tom Herbert, the program manager, said there's no way we are going to take 15 months to get this done. That's ridiculous. So we started going in the opposite direction and said, Well, can we do it in five months? That just didn't seem right. Understand, we did not have a scope yet. In the end we basically settled that we wanted to go live at the beginning of Q3 so we would be completely stable for Q4.

See Exhibit 2 for a summary of milestone ERP implementation dates.

[8]Redfield later noted that not all of those promises were met in the time frame agreed to during contract negotiations.

[9]Oracle and Cisco world headquarters are both near San Jose, California, approximately 20 miles from each other.

[10]Cisco's financial year end is July 31.

EXHIBIT 2
Summary of Milestone ERP Implementation Dates

Project kickoff	June 2, 1994
Prototype setup complete	July 22, 1994
Implementation team training	July 31, 1994
Process, key data, modification designs complete	August 31, 1994
Functional process approval	September 30, 1994
Hardware benchmark and capacity plan validated	October 15, 1994
Critical interfaces, modifications, and reports complete	December 1, 1994
Procedures and end-user documentation complete	December 16, 1994
Conference room pilot complete—go/no go decision	December 22, 1994
End-user training begins	January 3, 1995
Data conversion complete	January 27, 1995
Go live!	January 30, 1995

Source: Cisco ERP steering committee report, October 20, 1994.

That took care of setting a target date. Next came the task of estimating a project budget. Once again Cisco was aggressive: As Pete Solvik explained, "After we set a date, we estimated budgets. We put this whole thing together without really being that far into this program. We just looked at how much it touched." Instead of developing a formal business case (i.e., a financial analysis) to demonstrate the impact the project would have on the company, the team chose to focus on the issues that had sparked the analysis in the first place. In Solvik's view, Cisco had little choice but to move. He explained his approach to the situation:

> We said that we had this big outage in January. That we were the biggest customer of our current software vendor and that the vendor was being bought by another company. It was unclear who was going to support our existing systems, and we needed to do something. The reliability, the scalability, and the modifiability of our current applications would not support our anticipated future growth. We needed upgrades to the new version of the current application or we needed to replace it. If we replaced it, we could either do it in parts or do it as a whole. We evaluated those three alternatives, talked about the pros and cons of each alternative, and recommended that we replace our systems, big bang, with one ERP solution. We committed to do it in nine months for $15 million for the whole thing.

See Exhibit 3 for a breakdown of project costs.

Although Cisco was to some extent compelled to implement ERP, proceeding without a formal economic justification was also a matter of management philosophy. As Redfield put it:

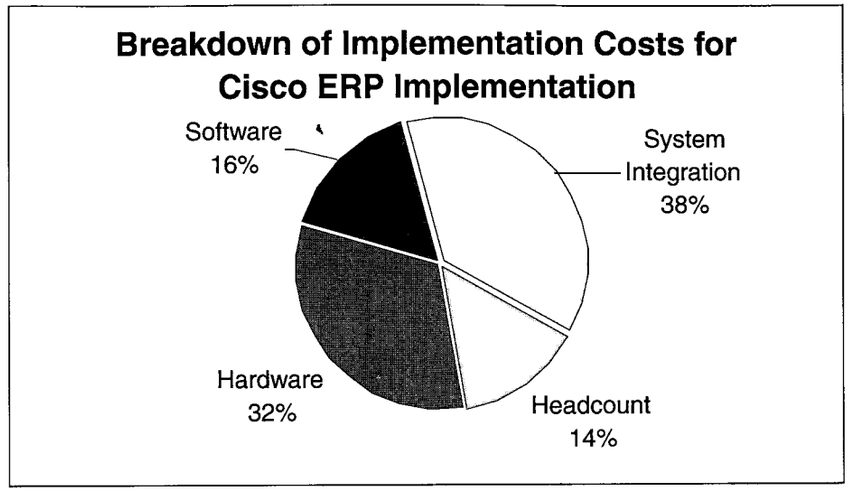
> You don't approach this kind of thing from a justification perspective. Cost avoidance is not an appropriate way to look at it. You really need to look at it like "Hey, we are going to do business this way." You are institutionalizing a business model for your organization.

At $15 million, the project would constitute the single largest capital project ever approved by the company. Members of the team prepared to take that number to senior management with some trepidation. The first meeting with CEO Morgridge did nothing to alleviate their concerns. Pond described the meeting with Morgridge this way:

> Pete Solvik, Tom Herbert, and I took the proposal to Morgridge, and the reaction was pretty interesting. He made the comment "You know, careers are lost over much less money than this." Pete and I were as white as a sheet of paper. We knew that if we failed, we were going to get shot. Failure is not something the business took to well, especially with this kind of money.

EXHIBIT 3
Breakdown of Implementation Costs for Cisco ERP Implementation*

*The project budget estimate did not include estimates of the cost of Cisco personnel time beyond that of some members of the core team.
Source: Cisco ERP steering committee report, October 20, 1994.



But Morgridge okayed taking the project proposal to the board. Unfortunately for Pond and Solvik, the reception was not much warmer there. Pond described what happened:

> Before we even get the first slide up I hear the chairman speaking from the back of the room. He says, "How much?" I said I was getting to it, and he responded: "I hate surprises. Just put the slide up right now." After I put it up he said, "Oh, my God, there better be a lot of good slides. . . ."

There were, and the board ended up approving the project.[11] In the weeks and months after the meeting, Morgridge did his part by making it clear to the rest of Cisco that the ERP project was a priority. The project emerged as one of the company's top seven goals for the year. "Everybody in the company knew this was happening, and it was a priority for the business," Pond explained.

Building the Implementation Team

With board approval in hand, the core ERP team lost no time setting up a structure for the implementation. One of its first acts was to extend Cisco's relationship with KPMG through the end of the implementation. That decision was based on KPMG's performance through the software selection process and the firm's continued commitment to staff the project with its most seasoned personnel.

Proceeding with implementation also meant that the team had to expand from its core 20 members to about 100, representing a cross section of Cisco's business community.[12] Again, the team

[11] Pond adds that the case for approval was aided by the fact that the legacy systems crashed on the day of the board meeting: "The day of the meeting, [the legacy system] went down. We were able to walk into the board meeting and say, 'It's down again.' It was really a compelling story."

[12] Total employment at Cisco was estimated at the time to be 2,500 people.