CASE STUDY

Dow Corning Corporation: Business Processes and Information Technology

Jeanne W. Ross

April 1997

CISR WP No. 298
Sloan WP No. 3951

Center for Information Systems Research
Sloan School of Management
Massachusetts Institute of Technology
77 Massachusetts Avenue, E40-193
Cambridge, MA 02139-4307

CISR WORKING PAPER NO. 298

TITLE: **CASE STUDY—Dow Corning Corporation: Business Processes and Information Technology**

AUTHOR: **Jeanne W. Ross**

DATE: **April 1997**

ABSTRACT: This case study, divided here into parts (A) and (B), describes one firm's experiences as it adopted a process perspective to managing its business, examined the implications for its information systems needs, decided to acquire SAP, an integrated, enterprise-wide software package, and embarked on the SAP implementation.

Dow Corning Corporation (A): Business Processes and Information Technology focuses on the business context and describes the role and structure of the information technology (IT) function at Dow Corning in late 1994. In the midst of a legal crisis that is draining financial resources, the firm must address global competition. The case poses the question of how should IT be organized and managed to meet current business challenges.

Dow Corning Corporation (B): Reengineering Global Processes is set in March 1997. The IT organization has been redesigned and reports to a member of the senior management team. The case focuses on Dow Corning's pilot implementation of SAP and its plans to reengineer global processes. Special attention is given to the IT unit's role in the reengineering and systems implementation processes.

27 Pages

This paper is also available from the Sloan Working Paper Series as Sloan Working Paper No. 3951.

Center for Information Systems Research
Sloan School of Management
Massachusetts Institute of Technology

Dow Corning Corporation (A): Business Processes and Information Technology

Introduction

In October 1994, Dick Hazleton, CEO of Dow Corning Corporation, was considering actions that could significantly affect the organization, staffing, and role of the Information Technology (IT) function in the company. Hazleton and other senior managers had agreed it was imperative to introduce major improvements in operational efficiency through a process-centered organization, not only to increase cash flow but to best position the company for long-term competitiveness. They knew instinctively that IT could play a major role in enabling operational changes, but were uncertain of just how that would occur or how it should be organized and managed. Hazleton wanted to move quickly, but knew the success of radical operational and work changes depended on the full support of his Operating Committee of sixteen senior managers and the support of every employee.

Background

Dow Corning Corporation was founded in 1943 as a jointly owned enterprise by The Dow Chemical Company and Corning Incorporated to develop the potential of silicone materials. Dow Corning's principal businesses were silicone materials and polycrystalline silicon. Silicones are chemical compounds based on silicon, an element refined from quartz. Silicone products vary from fluids used for antifoams and lubricants; elastomers used as building sealants, gaskets, and pacemaker leads; and resins applied as protective coatings. The corporation also manufactured high purity polycrystalline silicon, the principal intermediate material for semiconductor chips.

In 1994 Dow Corning had sales of $2.2 billion, approximately 8,300 employees and approximately 45,000 customers worldwide (see Exhibit A-1). It operated out of 29 manufacturing facilities on five continents, with greater than 50% of its sales generated outside the United States. The company was headquartered in Midland, Michigan, USA, with regional headquarters in LaHulpe, Belgium and Tokyo, Japan. The firm emphasized eight core values: integrity, customers, employees, safety, technology, quality, environment, and profit (see Exhibit A-2). Each year an internal publication reported key metrics on the status of each of these values.

Dow Corning developed, manufactured, and marketed almost 5,000 silicone products and related specialty chemical materials. Seven to eight percent of sales revenues were regularly devoted to research and development, and in 1994, twenty percent of revenues were from products

This case was prepared by Jeanne Ross at the MIT Center for Information Systems Research. The author would like to thank Chuck Gibson for his helpful direction and comments, and Charlie Lacefield, Marian Cimbalik, and the other Dow Corning employees who contributed insights, cooperation, and support.

introduced in the last five years.[1] Dow Corning had long competed with large regional and global companies, such as Shin-Etsu in Asia, Rhone Poulenc and Wacker in Europe and the U.S., and GE globally, but newer niche players were increasing the pressure on both quality and price. At the same time, Dow Corning's customers were demanding faster cycle times and greater responsiveness to unique needs. Management perceived both economies of scale and customer responsiveness would be essential in order to remain competitive in the global marketplace.

In 1976 top management introduced a unique multidimensional organizational structure that recognized the diverse demands of business, geographical area, and function. Dow Corning successfully used this structure, which gave most professionals multiple bosses, while other firms were failing in their efforts to establish matrixed reporting relationships. Industry experts credited this structure with providing a major competitive advantage.

The matrix structure allowed Dow Corning to view itself by business group, geographical area, or specific function. It had two business groups: the Core Products Business Group (CPBG) and the Advanced Materials Business Group (AMBG). While the two groups had some overlap, they were distinguished by the CPBG's emphasis on products with established operational excellence and global reach in contrast to the AMBG's product innovation orientation and focus on local and regional customer relationships. Geographically, Dow Corning had three areas: Europe, Asia, and the Americas. Functionally, the firm had four key units: Manufacturing and Engineering, Science and Technology, Marketing and Sales, and Administration. The heads of the two business groups, three geographical areas, and eight functions were all company officers.

In its value statement, Dow Corning articulated its commitment to an open and creative culture that recognized employees as the primary source of ideas, actions, and delivery of performance. Dow Corning's consistent growth performance had resulted in a stable work environment that reinforced the loyalty of its employees. Recognizing the value of this stability, the management team was determined to avoid reengineering initiatives driven solely by the need to downsize the organization.

The Breast Implant Crisis

In 1992, arguing that manufacturers had not sufficiently demonstrated the safety of breast implants, the Food and Drug Administration (FDA) restricted the sale of silicone gel-filled breast implants. By that time, Dow Corning, which had been manufacturing implants for almost 30 years, already had discontinued production partly in response to a trickle of lawsuits that attributed various autoimmune diseases to the implants. The FDA action led to a torrent of product liability lawsuits. While the link between silicone implants and connective tissue disease or other illnesses was not supported by scientific evidence, sympathetic juries made multi-million dollar awards to plaintiffs. By early 1994, over 9,000 lawsuits had been filed against Dow Corning, which had been the largest manufacturer of breast implants. Both to reduce uncertainty and to place some limit on the total payout, the major manufacturers in April 1994 agreed to set

[1] Through 1996 Dow Corning's performance, as characterized by the meters and measures defined in the case, was positively sustained. Dow Corning's targeted performance through the turn of the century reflects the continuation of these results.

aside $4.23 billion for women with breast implants, of which Dow Corning committed $2 billion.

Intensifying competition and increasing customer requirements, coupled with breast implant litigation, created a need to meet changing customer expectations and to optimize cash flow. In 1992 and 1993, the firm recorded net operating losses as a result of breast implant-related charges. While breast implants had been a very small part of the firm's revenues (less than one percent), the litigation and publicity were consuming significant human and financial resources. In June 1993, when Richard Hazleton became CEO in addition to his role as president of Dow Corning, he took on a challenging leadership assignment.

Hazleton promised employees and shareholders he would continue an environment of open communication concerning both the breast implant crisis and Dow Corning management. Employees responded to this openness and rallied around Hazleton and the rest of the top management team. They even voluntarily bought six pages of advertising, costing $5,170 in the local Midland Daily News. On these six pages, 2,068 employees signed their names to a statement of support. The message stated:

> To: Dow Corning Executive Management
> Your Employees are Behind You 100%

Hazleton's continuing commitment to openness extended to the management culture. Charlie Lacefield, Vice President and Executive Director, Manufacturing and Engineering, described the environment:

> The culture of the corporation is that it is okay to disagree. Management is comfortable saying "I don't know."

The IT Function at Dow Corning

In 1994, Dow Corning's core IT unit, Systems and Information Management (SIM), had a staff of 120 headed by a director, who reported to the Vice President of Science and Technology (see Exhibit A-3). SIM oversaw mainframe transaction processing, which was centralized in Midland, and the global network that enabled it. The unit was also responsible for telecommunications, mainframe e-mail (IBM's PROFS), end-user training, and global systems supporting financial reporting, procurement and process control. The SIM budget had grown from $10 million to $20 million between 1984 and 1994, but as a percentage of sales, the budget had shrunk, representing less than one percent of sales in 1994.

In 1992 SIM management had issued *Dow Corning Information Network Principles* in recognition of the changing business environment and the growth of end-user computing. The principles described how the company would "tend to do computing in the future." Key principles included:

- increasingly decentralized IS decision making;
- faster cycle times;
- greater empowerment;
- working closely through standing committees to develop plans, strategies, policies, priorities, and controls.

Several of the standing committees were comprised of corporate and regional senior managers. These included the Systems Management Board (SMB), European Competitive Computing Board (CCB), Japan-Pacific SMB, and Dow Corning Inter-America (DCIA) SMB. Others were comprised of local IS staff and power users, such as Dow Corning Information Network (DCIN) Leadership Council, DCIN User Council, Science & Technology (S&T) Computing Council, and the Process Information & Control Technology Center. The committees were expected to provide strategic and technical direction, but Operating Committee members tended not to be involved with them. Some members of the Operating Committee believed they needed to better understand the importance of information management.

> Top management must declare an IS strategy and approach and then say "do it." When we tried to do it by consensus—there were too many chiefs.
>
> *—Process Manager, Personnel Management Process*

The firm's centralized information systems capability had been an important tool for enabling its multidimensional organizational structure. As such, managers noted that the IS function provided a competitive advantage in the 1970s. Over time, however, individual functions and sites had developed their own IS capability to meet unique or immediate business needs. By the early 1990s, IS functions were fairly evenly divided into three parts: SIM, functional IS staff reporting to functional directors, and IS staff at individual manufacturing facilities. This distribution of IS resources had led to a proliferation of useful, stand-alone systems. The inability to integrate these systems within and across sites hampered efforts to develop disciplined processes in support of globalization:

> When I went to the Midland Plant in 1992, I killed more software projects in the first six months than I had in my whole career. It was becoming an enormously ugly patchwork quilt. I mean the systems wouldn't talk to each other. Nice functionality, but they wouldn't talk to each other.
>
> *—Midland Site Manager*

Top managers were particularly concerned about the lack of global supply chain management. At Dow Corning the supply chain started with understanding customer requirements and ended with satisfying those requirements. Thus, it encompassed order entry, manufacturing, and distribution. In 1991 SIM initiated the GOES project (global order entry system) as a first step toward addressing global supply chain management needs. GOES was expected to link orders with manufacturing around the world. The project was very high profile and engaged individuals throughout the company to define requirements and support implementation. By mid-1994 the customer management module had been implemented in most parts of Asia and Inter-America, but the project was well behind schedule and estimated to be at least four years from completion:

> GOES struggled because we tried to put a global team together but everyone had their area perspective of what the requirements should be. It made it very difficult for us to get our hands around what were really global requirements.
>
> *—Project PRIDE Workflow Technical Leader*

In the meantime, Dow Corning had started to investigate the worldwide implementation of SAP, a software package, as an alternative to integrating the existing supply chain processes and systems. Many other chemical companies were implementing it, and there was strong sentiment at Dow Corning that the firm should be buying—not developing—systems of that magnitude.

> SAP would be a fast and effective way to get the global discipline on integrated common systems. It would, if properly implemented, correct for our lack of internal discipline.
>
> *—BPIT Director, Europe*

A committee report submitted to Hazleton in the Fall of 1994 noted that SAP would support a process, rather than functional, approach to managing the company. The report emphasized that top management commitment and effective communication would be critical to the success of an SAP implementation. The committee also highlighted that SAP would demand a new technology infrastructure and new IT skills.

The push towards SAP accompanied growing management sentiment that SIM had a control mentality and lacked a sense of urgency. Top management felt that the unit had been well-managed and had capable staff, but that it had been operationally focused and lacked a strategy.

> We were state of the art in IT in the mid-1970s. IT was an enabler of success. Then we got cost conscious and fell behind.
>
> *—Operating Committee Member*

Hazleton was convinced that the IT function was critical to enabling global process redesign in the organization. He noted that his goals for IT would be to (1) compress cycle time by getting necessary information into work processes for faster decision making; (2) focus on global shared resources and capability; and (3) provide tools and information to support empowerment. While he understood his goals, he was not sure how to provide the environment for achieving them:

> I've been reading on IT but I'm terrified. It's the one area where I don't feel competent. I sense that we're not getting good value for the money.

Prior to October 1994, Dow Corning had spent considerable time and resources on identifying the business processes for the corporation. But implementation was only marginally successful due to aging information systems that were aligned with the more traditional functional organization. Information systems capabilities that transcended organizational boundaries and linked the activities of a process-centered organization were an important part of the changes envisioned by Hazleton and his management team.

Action Steps for Top Management

To address the issues facing SIM and the entire IT function, the Operating Committee had appointed four of its members as a subcommittee. The "gang of four", as they came to be called, included the three Vice President/Executive Directors for Science and Technology, Manufacturing and Engineering, and Human Resources, and the President for the Inter-American

Area. With the Operating Committee's full support, the committee sponsored an assessment of IT and sought recommendations from consultants on the role and organization of the entire function. They particularly were interested in how IT fit into the potential for process change and the impending implementation of SAP.

Dick Hazleton awaited the consultants' report, but was already thinking of options for how the IT function should be organized and what kind of manager should lead it. It seemed to him the time was right for a new era of IT support in the business to begin.

Exhibit A-1

DOW CORNING CORPORATION
CONSOLIDATED STATEMENT OF OPERATIONS AND RETAINED EARNINGS
(in millions of dollars except share data)

	Year ended December 31,		
	1993	1992	1991
NET SALES	$2,043.7	$1,955.7	$1,845.4
OPERATING COSTS AND EXPENSES:			
Manufacturing cost of sales	1,403.9	1,343.2	1,195.5
Marketing and administrative expenses	403.9	410.4	397.3
Implant costs	640.0	69.0	25.0
Special items	----	40.0	29.0
	2,447.8	1,862.6	1,646.8
OPERATING INCOME (LOSS)	(404.1)	93.1	198.6
OTHER INCOME (EXPENSE):			
Interest income, currency gains (losses) and other, net	15.4	(20.6)	31.9
Interest expense	(33.3)	(22.5)	(21.5)
INCOME (LOSS) BEFORE INCOME TAXES	(422.0)	50.0	209.0
Income Tax provision (benefit)	(150.9)	10.1	58.3
Minority interests' share in income	15.9	11.5	14.1
INCOME (LOSS) BEFORE CUMULATIVE EFFECTS OF CHANGES IN ACCOUNTING PRINCIPLES (1993 - $(114.80) per share; 1992 - $11.36 per share; 1991 - $54.64 per share)	(287.0)	28.4	136.6
Cumulative effect of adopting Statement of Financial Accounting Standards No. 106 - *Employers' Accounting for Post-retirement Benefits Other Than Pensions, net of applicable income taxes* ($(46.72) per share)	- - -	(116.8)	- - -
Cumulative effect of adopting Statement of Financial Accounting Standards No. 109 - *Accounting for Income Taxes* ($6.56 per share)	- - -	16.4	- - -
Cumulative effect of a change in accounting for fixed costs recorded in inventory, net of applicable income taxes ($6.52 per share)	- - -	- - -	16.3
NET INCOME (LOSS) (1993 - $(114.80) per share; 1992 - $(28.80) per share; 1991 - $61.16 per share)	(287.0)	(72.0)	152.9
Retained earnings at beginning of year	891.3	1,028.8	953.4
Cash Dividends (1992 - $26.20 per share; 1991 - $31.00 per share)	- - -	(65.5)	(77.5)
Retained earnings at end of year	$ 604.3	$ 891.3	$1,028.8

The Notes to Consolidated Financial Statements are an integral part of these financial statements

Exhibit A-2

OUR VALUES

Integrity
Our integrity is demonstrated in our ethical conduct and in our respect for the values cherished by the society of which we are a part.

Employees
Our employees are the source from which our ideas, actions and performance flow. The full potential of our people is best realized in an environment that breeds fairness, self-fulfillment, teamwork and dedication to excellence.

Customers
Our relationship with each customer is entered in the spirit of a long-term partnership and is predicated on making the customer's interests our interests.

Quality
Our never-ending quest for quality performance is based on our understanding of our customers' needs and our willingness and capability to fulfill those needs.

Technology
Our advancement of chemistry and related sciences in our chosen fields is the Value that most differentiates Dow Corning.

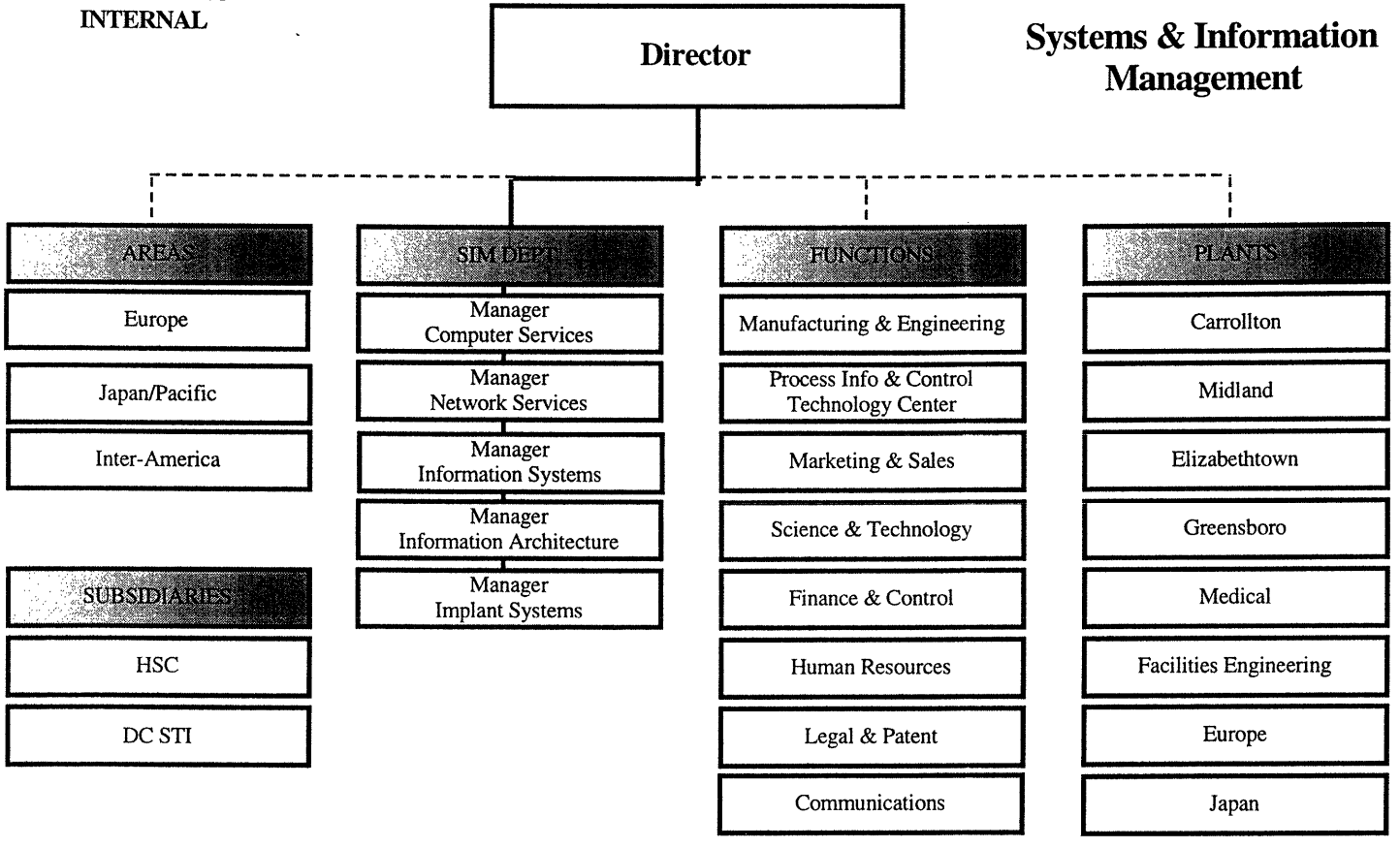
Environment
Our commitment to the safekeeping of the physical environment is founded on our appreciation of it as the basis for the existence of life.

Safety
Our attention to safety is based on our full-time commitment to injury-free work, individual self-worth and a consideration for the well-being of others.

Profit
Our long-term profit growth is essential to our long-term existence. How our profits are derived, and the purposes for which they are used, are influenced by our Values and our shareholders.

DOW CORNING
INTERNAL

Systems & Information Management



Center for Information Systems Research
Sloan School of Management
Massachusetts Institute of Technology

Dow Corning Corporation (B): Reengineering Global Processes

Introduction

In early March 1997, Charlie Lacefield, Vice President & Executive Director of Business Processes and Information Technology at Dow Corning Corporation, was reviewing progress on Project PRIDE (Process Reengineering through Information Delivery Excellence), the corporation's long-term reengineering effort. The recent pilot implementation of SAP software in the United Kingdom had been a small, but important, step in providing the systems foundation for reengineering. The success of the pilot had resulted from intense effort on the part of many people at the pilot sites and the support organization at corporate headquarters. While some members of the global team were hoping to slow down and reflect on what they had learned from the pilot project, Lacefield felt it was important to set an ambitious deadline for the next set of implementations.

> If you want to sustain the momentum of the change program, you have to continue to have milestones out there that are aggressive and challenging. Otherwise, you get to the end of the pilot and it is kind of like everything else is going to be anticlimactic when it is only the beginning. So you need to run a little faster than when you ran the pilot. Learning should allow you to do that.

Background

Dow Corning Corporation, a jointly owned enterprise of The Dow Chemical Company and Corning Incorporated, developed and manufactured silicon and silicone-based products for the global market. The company had a history of consistent growth in sales which reached $2.2 billion in 1994 and $2.5 billion in 1995. As a result of charges to income for current and future settlements of lawsuits related to silicone gel-filled breast implants, however, Dow Corning had recorded operating losses in both years. In May 1995, in an attempt to stem potentially catastrophic impacts of settlements on its financial stability, Dow Corning filed for protection under Chapter 11 of the federal bankruptcy laws.

In addition to the financial uncertainties stemming from the breast implant crisis, Dow Corning was facing increasing global competition. The global competition presented requirements for faster cycle times, lower costs, and greater responsiveness to customer needs. To address these requirements management felt that it was imperative to reengineer the global supply chain. At the heart of the reengineering effort was the implementation of SAP/R3.

This case was prepared by Jeanne Ross at the MIT Center for Information Systems Research. The author would like to thank Chuck Gibson for his helpful direction and comments, and Charlie Lacefield, Marian Cimbalik, and the other Dow Corning employees who contributed insights, cooperation, and support.

Senior management had agreed to the SAP implementation in early 1995 at about the same time that they had introduced three major changes in IT management. First, a new committee, the Process and Information Technology Board, consisting of senior level officers was created and given responsibility for setting the global strategic direction for IT. Second, the IT function was combined with business process efforts to create a new organizational unit called BPIT (Business Processes and Information Technology). Third, Charlie Lacefield, the Vice President of Manufacturing and Engineering, was appointed to the newly created position of Vice President & Executive Director of Business Processes and Information Technology.

The Process and Information Technology Board undertook serious discussions about key processes at Dow Corning and the role of information technology. With the support of Dick Hazleton, the CEO, they proposed that Dow Corning move away from its traditional focus on function and towards a process orientation that recognized the interdependencies of the distributed functions and sites in meeting customer needs. They identified four key operational processes and four decision-making processes (see Exhibit B-1) that demanded seamless information flows across sites. By reengineering these eight processes, they believed Dow Corning could radically increase its cost effectiveness and responsiveness.

Hazleton had selected Lacefield to head the IT unit based on the recommendations of consultants, who had indicated that he was viewed as a forward thinking manager and was well-respected by senior managers. Lacefield, who did not have an information technology background, had been a member of the committee which had urged top management to create the new role. He felt that the IT unit had a talented staff who would become critical to the reengineering efforts. Lacefield sought to learn everything he could about information technology through readings and constant communication within and outside Dow Corning. He planned to establish a limited set of strategic priorities for the IT unit and then "cut loose the IT people so that they could do things."

At every opportunity Lacefield used the IT decision-making process to reinforce the integration of business processes and information technology. As a member of the Operating Committee he wanted to ensure that investment of Information Systems (IS) resources was clearly aligned with the business process priorities. Functional computing organizations were reorganized into a two-dimensional federal system with Corporate Information Systems (CIS) providing IT leadership, synergy and conformance across IS units (see Exhibit B-2), while area IS organizations focused on implementing IT solutions, providing localized service, and ensuring an effective interface with users. This modified organization leveraged global systems functionality and infrastructure capabilities, and reduced the reinvention of computer systems that resulted from decentralized efforts.

Project PRIDE: Organization

Lacefield made clear that the primary goal of the IT unit was to support Project PRIDE, Dow Corning's long-term reengineering effort. Management used the graphics in Exhibit B-3 to communicate their view of the reengineering effort with employees. First, the implementation of SAP/R3 would facilitate implementation of global transaction processes. While this alone would generate benefits, the firm anticipated even more significant benefits from the redesign of Dow

Corning's four core operations processes: customer focus, product delivery, financial management, and personnel management. Finally, the reengineering would extend to the four decision-making processes: opportunity development, portfolio management, people development, and direction and planning. The reengineering efforts had an expected duration of about ten years. Benefits would grow and people skills would evolve throughout the process.

Dow Corning management decided to invest in the SAP software because analysis showed the software would enable the company to reengineer its global workflow processes. Contract negotiations focused on the full suite of software, a single worldwide agreement, maximum user seat discount rate, and lowest maintenance cost. Implementation of the software was to include some workflow redesign efforts that would yield visible benefits with delivery of the initial application, recognizing that radical reengineering initiatives, having a longer timeline, should not slow the software implementation.

To ensure that the implementation ultimately would lead to radical change in the firm's key processes, senior management developed a "Top 10" list of reengineering priorities. These radical change opportunities, shown in Exhibit B-4, provided focus for the SAP/R3 implementation. Top management hoped to achieve full SAP implementation and the Top 10 reengineering priorities by 2000.

In June 1995, a global team of forty well-respected operations and IT professionals was assembled from sites all over the world and brought to Midland to learn SAP/R3 and to design global processes. The team was instructed to design workflows around the capabilities of the software rather than solicit requirements based on current Dow Corning practices. This strategy resulted both from the learning of the failed Global Order Entry System project, which had become mired in a consensus building process, and from the understanding that SAP had attempted to build "best practice" into the software. While many firms implemented only selected modules from the SAP suite, Dow Corning intended to implement the full range of capabilities offered by SAP in order to integrate the sales, production, distribution, finance, and human resource functions.

The team was divided into smaller teams, each focused on one of the SAP software modules. Each team was to learn the functionality in its area of expertise and to coordinate with the other units to ensure a good fit between their integrated processes. Despite the fact that Dow Corning had no prior SAP/R3 expertise, the team was to receive minimal support from consultants. Ultimately, Dow Corning would have to support SAP in house, both technically and organizationally, so management opted for bringing employees up the learning curve by having them lead the implementation process. The vote of confidence boosted global team members' confidence:

> When Charlie Lacefield moved into his role what he had was a very good group of folks, and what he did was show a lot of confidence in those folks, and it was genuine. The proof that he felt that way was the fact that he didn't outsource this thing to Andersen or Price Waterhouse. And not just Charlie but other management too said, "We're going to let our people do this and we're going to

put them in charge of this and we'll use consultants when we need to but we have the expertise to do this." This is proof that management really has confidence in us and that's a very exciting thing.

—Information Architecture Department Manager

Project PRIDE: SAP Project Management

While the mission of the global team was clear to all its members, the processes for accomplishing it were not. Team members quickly learned that SAP/R3 was extremely complex and SAP had little documentation, inadequate training, and a limited installation base to provide reference points for learning the software and configuring the system. Most of the team members attended an extensive training session offered by SAP in September 1995, but much of the training was on SAP/R2 and was not directly transferable to R3. They returned to Midland still struggling to understand the methodology for simultaneously learning the software, designing processes, and configuring the system. They were particularly challenged by the highly integrated nature of the software, which they cited as its greatest strength and its greatest weakness. On the one hand, the small teams had to focus on a fairly narrow functional area in order to understand the software's capability. On the other hand, they had to recognize how their configurations impacted, and were impacted by, other areas, some of which had not yet been explored. They spent much time hands-on with the SAP/R3 software exploring what it could and could not do.

For purposes of maintainability, Dow Corning was committed to minimizing changes to the SAP software. Requests for "mods" had to go through the Process and Information Technology Board because of their implications for software maintenance. In some cases, the Board decided changes were necessary to enable unique Dow Corning work requirements, and in those cases programming changes were made. However, team members who requested such mods were often unsure if the need for a mod resulted from a deficiency in SAP/R3 or from the team's own inability to learn how SAP allowed a particular process to be performed:

In accounting we decided to value all our transactions in a certain way for management and do it a different way for statutory requirements, and SAP, to our knowledge, didn't handle that requirement. So we had to put some programming in to convert from one to the other. Well now that we've completely examined our process and we understand what it is we really need to do and what SAP can really do for us, we'll end up with a far superior process and not have to use the changes that we made in SAP.

—Project PRIDE Financial Management Module Team Leader

Team members recognized that SAP did not provide full functionality, particularly for manufacturing. Ultimately, they would need some "bolt-ons" which would interface with SAP/R3 to provide capabilities that SAP had not provided. Growing numbers of vendors were building "bolt-ons" for capabilities such as bar coding, Electronic Data Interchange (EDI), Production Planning for the Process Industry (PPPI), and form printing. For the earliest implementations, the team intended to minimize bolt-ons to ensure that the core of the system went in successfully, but it meant sacrificing functionality that had existed on Dow Corning systems in the past:

> When we're talking about functionality such as automated data collection (bar-coding), our existing applications helped reduce the number of people necessary to do the tasks. Now if we come back in with less functionality, obviously they're going to add more human resource to support their business. That is a concern.
>
> *—Project PRIDE Workflow Technical Leader*

The team struggled constantly to define its methodology and establish a project plan, but the complexity of the software and the integration of the individual pieces made that difficult. Team members noted that prior project experiences did not help them manage this particular project:

> Some folks on my team who come from a rigorous manufacturing background asked, "Where's our project plan?" We're doing a lot of this on faith. I mean how do you put a plan out there and say, "Learn SAP. OK, you've got two weeks to learn that and then you've got two more weeks to learn this." You really can't plan learning or knowledge transfer the way you plan a production schedule.
>
> *—Project PRIDE Product Delivery Module Team Leader*

In February, 1996, Lacefield observed that the team was losing momentum as they became overwhelmed by the complexity of the system and its tight integration. He reorganized the team to reduce the number of leaders from eight to four—one for each of the four core operations processes—and brought in a new project manager, Ralph Reed, site manager in Midland. He also set a September 30 deadline for implementation at three pilot sites in the United Kingdom. The tight deadline motivated the team leaders to delegate more decision making to individual team members and concern themselves less with reaching consensus:

> What's the opposite of a good solution? Another good solution! There's lots of different ways to do things. Just pick one and get the momentum behind it and you're going to be successful. I think that's what ended up happening. We picked one, we got buy-in, and I think we've been successful with that.
>
> *—Project PRIDE Product Delivery Module Team Leader*

The Transformation of IT at Dow Corning

The repositioning of IT had transformed it from a service unit aligned by business function to an integral part of the business concerned with business process:

> We went from being aligned under a lower level manager to a Vice President that has pushed BPIT. Ever since Charlie Lacefield took over we have dramatically changed as an IT organization. And I think the idea of bringing in SAP was great because it forced us as a company to step up to client server, step up to the infrastructure. We're getting away from doing a lot of programming to doing systems integration. I think it's going to enable us, from an IT perspective, to become more business process oriented, understand that, and open up more doors within the company.
>
> *—Project PRIDE Workflow Technical Leader*

The shift to distributed processing that accompanied SAP introduced a new set of challenges. In the past, the central unit could provide for all infrastructure needs from Midland. Distributed processing meant that they would need to localize some services:

> Our legacy environment does have multi-language capabilities. Our material safety data sheet, for example, we're printing in 20 some languages. So we do have a fair bit of expertise, but what we don't have is a help desk that has individuals who speak other languages, especially Asian languages. So support's a major concern in terms of a global support organization that involves local help desks with local language speaking individuals who have the needed expertise.
>
> —*Information Architecture Department Manager*

IT management believed that a tightly coordinated infrastructure was needed to make the distributed computing environment work. They addressed infrastructure requirements through eleven competency centers (described in Exhibit B-5), staffed full-time by corporate IT and, on a part-time basis, by IT members of local offices. Leaders of the competency centers met weekly to address cross-functional concerns. Many of the competency center leaders also led efforts supporting Project PRIDE. As they developed the infrastructure to support SAP/R3, they considered the broader needs of Dow Corning. PRIDE was driving IT requirements, and the IT unit was accomplishing its mission to build capabilities that would support future business needs.

A key initiative supporting Project PRIDE was the GWP (Global Workstation Project). Dow Corning signed a leasing arrangement with IBM that would put a standard desktop unit loaded with Windows 95 and Microsoft applications on every desk. The standard desktop unit would be a key enabler of R3 implementations by ensuring necessary computing power and facilitating troubleshooting:

> GWP is very much the beginning point of implementing SAP in the future, because we want to have a standard base. A user calls the Help Desk and we don't have to ask, "Did you get that at Best Buy or Circuit City?" We know what they've got. If there are problems we simply take a Gold CD and reinstall the software and it should be up and running again. Even remotely.
>
> —*Project PRIDE Workflow Technical Leader*

The architecture underlying the R3 implementation called for a centralized database despite the distributed processing. This architecture recognized both the limitations of the software and the business requirements of Dow Corning:

> SAP articulated the benefits we would get if we had what they call a single image, a single database. We really felt those benefits were significant. And this was not largely an IT decision. It was what can we do functionally if we have a single database, like the ability to do credit checks globally without having the complexity of having to do them across separate systems that have separate customer databases and such.
>
> —*Information Architecture Department Manager*

The biggest technical challenge of R3 implementation was doing backups, database reorganizations, and upgrades. SAP was developed under the assumption that the system could be brought down during operations like these, but downtime was not feasible for a centralized system supporting global operations. So Dow Corning had invested in a hot site that would mirror operations and had developed some creative programming that would keep the two systems in synch during maintenance procedures:

> Today to do an upgrade takes 48 hours and there's no faster way—you buy the fastest hardware, the best people, and still in the best case, it takes 48 hours. That's 48 hours that the system is not available to users.
>
> *—Associate IT Consultant*

The Pilot Implementation

The pilot implementation delivered all SAP modules, except Human Resources, to approximately eighty employees at three sites involved in the rubber supply chain in the United Kingdom (Barry, Cowbridge, and Manchester). Charlie Lacefield and Ralph Reed worked with top managers in the region to explain the importance of global process reengineering and the role of SAP/R3 in supporting that initiative. Management at all three sites prepared employees for major changes in their processes, although they knew little about the nature of the changes:

> The area manufacturing director, the sales and marketing director in the area, and the financial director, along with the head of IT for Europe got together as a group and spoke with one voice: "We support this, we're going to do this, we're going to do this well, we're going to embrace this, we're going to make it work."
>
> *—Project PRIDE Product Delivery Module Team Leader*

Approximately 25 members of the global team went to the UK to explain the new processes to employees and to support the implementation process. They arrived around three weeks before implementation, and in some cases, stayed seven weeks to help local staff adapt to the new processes. While the global team had specifically avoided learning "as-is" processes because they were not relevant to determining global best practices, they found that their limited understanding of local processes hampered their ability to explain new processes:

> We didn't know that the person carrying the title of production supervisor was doing procurement, planning, and scheduling. We had no clue what else this person was doing. We didn't know their roles in their previous environment and we were not prepared to tell management these are the jobs that these people are doing, this is how these jobs are evolving with the new work flows. And that has been a bottleneck.
>
> *—Project PRIDE Customer Focus Module Team Leader*

The pilot met the deadline. By September 30, all modules were up and running (except for Human Resources, which was not scheduled for implementation until most sites were running the initial installation), but to meet the deadline the team had to abandon some of the functionality they had hoped to include. For example, they had wanted to automate authorization

notices for large purchases, but they were unable to get that working well. The team decided to hold off on this functionality for later implementation. In some cases, such as recording the movement of goods within a warehouse, the implementation created new work. Yet in spite of these problems, individuals at the pilot sites noted the advantages of having a single global system and were optimistic that benefits at the local sites would accrue over time:

> SAP has advantages. At the moment we're experiencing a lot of disadvantages. We are not realizing productivity gains on a day-to-day basis, but there are control benefits. I think in five years' time, we'll have an integrated, coherent system which will free up staff to make better use of information rather than having to maintain and control the information.
>
> —*Chief Accountant, UK Manufacturing Site*

For its part, IT's presence at the pilot site was almost invisible by the implementation date. By then the challenges centered on new workflows, not technical difficulties. Hardware, software and data were already in place and local power users had accepted responsibility for technical responsibilities, such as loading data tables and maintaining servers and printers:

> We got things in just in the nick of time and it was very stressful. And things were being tweaked and fixed all the way right up until the day before it went live. An interesting observation, I think, is that the approach that was used with the goal of not allowing the schedule to slip was one of adjusting the scope. But you can't do that with infrastructure. You can't say we're only going to put in 15 workstations instead of 30, and you can't say we're going to put in part of the local area network instead of all of it.
>
> —*Information Architecture Department Manager*

Preparing for Future Implementations

The pilot implementation provided some important learning and Lacefield worked with global team management to formalize as much of that learning as possible and restructure roles as appropriate:

> Because of the complexity of this you just cannot believe that you have got all the insights necessary to put the full game plan together. That is one of the reasons that after each major milestone on Project PRIDE we reassess what the next dimensions ought to be. Not that there are major wild changes because if you are out of control then I think you don't have a plan. But adapting a plan from what you learn is very positive.
>
> —*Charlie Lacefield*

In particular, the implementation had helped clarify the role of the global team. The global team had accepted primary responsibility for working with individuals implementing R3 at the pilot sites. In future implementations, management expects to rely on area teams for implementation support in order to allow the global team to focus on adding functionality and performing multiple implementations. The area teams were critical to the firm's ability to fully implement

SAP by 1999 because the global team could not become personally involved in implementations at all the sites:

> It became obvious to me very quickly that the only way to do a project is to do it as fast as you can, whether we are building a manufacturing facility or whether we are doing a PRIDE piece. It also became obvious to me that the core global team, as we call it, can't do it all. There are just not enough hours in the day or enough bodies in those hours. Now that means that we have got to expand our horizons with regard to the number of people who are in the passing judgment mode into the involvement mode. That means we have to accelerate the training.
>
> *—Ralph Reed, Manager, Project PRIDE*

The model called for three area teams: one each in Europe, Asia, and the Americas. These teams were expected to handle eighty percent of implementation needs, while the global team would provide the remaining support. The European area team had consisted of fourteen persons for the pilot. Once the global team had left the UK, the area team had responsibility for system and workflow support. They quickly learned, however, that they had not been adequately trained to fill that role. Instead, they functioned as mailboxes, where users would submit questions that they would forward on to the global team. Eventually, the area team members were dropped from the loop as both individual users and global team members found it more efficient to communicate directly.

To ensure that area teams were better prepared to support local implementations, management created the PRIDE Academy, which provided extended training for area team members. Initial training took place in Midland, where global team members not only taught existing functionality, but also sought the expertise of area team members on the design of new work processes. After several weeks in Midland, area team members returned to their local sites where they were to test the system prior to implementation. Area team members would return periodically to Midland for additional training and to participate in multiple implementations to accrue learning from their own experiences. The first class, which included twenty-five Asians, thirty-two Americans, and nine Europeans, concluded in early March 1997 and entailed three weeks of intensive training.

Next Steps

As part of the process of redesigning workflows and developing additional functionality, global team members had started interacting more with functional experts throughout the company. These "think tanks" assembled individuals who could envision processes associated with the top ten priorities and who could help define best practices:

> In this way we get experience from outside of PRIDE so it expands our experience base and it also starts to help us communicate and get buy-in for the changes around the organization. These are highly respected people that we pulled into this, respected for their technical abilities, respected for their ability to get things done, to think differently, to think out of the box. In one case, for example, there are 24 people on the team. You can get a lot of mileage out of 24 people going

back out into the organization saying, "Listen up here, folks. I just had a hand in developing this process, and you're going to see it coming your way in a couple of years."

—Project PRIDE Financial Management Module Team Leader

While these "think tanks" would provide some insights into the R3 implementation, their more important role was to bridge the initial SAP implementation to the larger reengineering effort. SAP would lead to some changes and greater discipline, but senior management had purposely not attempted to accompany the SAP implementation with radical reengineering:

> If we slow down and wait for the reengineering to catch up with the software we are going to lose momentum and we are going to lose the stability of the team. You can't hold a team together for four or five years. In fact the reengineering piece has got all this human side of it which is changing people's ways of doing things and changing the culture which is a longer process than putting the software in place.
>
> *—Charlie Lacefield*

The IT unit turned to issues of scale. Supporting the needs of 100 English-speaking users in three sites was not a problem, but adding sites would create new challenges, such as time-zone functionality, multiple language capabilities, and meeting scalability requirements:

> We have enough hardware easily to handle the 100 users, but no one I've talked with yet has run 3,000 concurrent users on SAP. In fact, no one has run 2,000. No one I've talked to has even run 1,000 yet. So the first question is can we be sure that SAP and the hardware/software will actually scale to what we're expecting it to do. The second issue is availability. That is very difficult to forecast.
>
> *—Associate IT Consultant*

IT would be working with the global team to identify and support key bolt-ons. As they moved into sites that had been highly automated, they anticipated some resistance to a system that would reduce automation and demand increased human resources. They wanted to meet key needs as quickly as possible without jeopardizing management's desire to bring on new sites in rapid succession.

The next implementation would take place in Wiesbaden, Germany in April. Lacefield and Reed were working to enlist the commitment of management at the sites to the kinds of changes that were forthcoming. Lacefield had been communicating for over a year with area managers about the need for Dow Corning to function as a global corporation, and he found support conceptually for what they were trying to accomplish. He noted that continued top management commitment was key to his communication efforts:

> The real issue that people ask about is management's staying power. Will we continue to drive at this or somewhere along the line will there be a new flavor of

the day? That is where management commitment and visibility is absolutely important.

Management recognized significant risks in attempting a global systems implementation in order to drive reengineered, common processes and increased discipline around those processes, but they believe that these efforts were critical to Dow Corning's long-term competitiveness:

> People might sit back and say, in an academic sense, what if this thing fails. And my view is that it is an irrelevant question because we can't go back. All we have currently is a bunch of old legacy dogs that are going to die. We have got to go forward and we may not be in the exact place where we think we will be but we will be close. And that will be successful to me. We have got to do it. The alternative is nowhere. It has almost ceased to exist. So it has got to succeed and, by and large, people are willing to do whatever it takes to make it so.
>
> —*Ralph Reed*

4-16-97

Dow Corning Business Processes

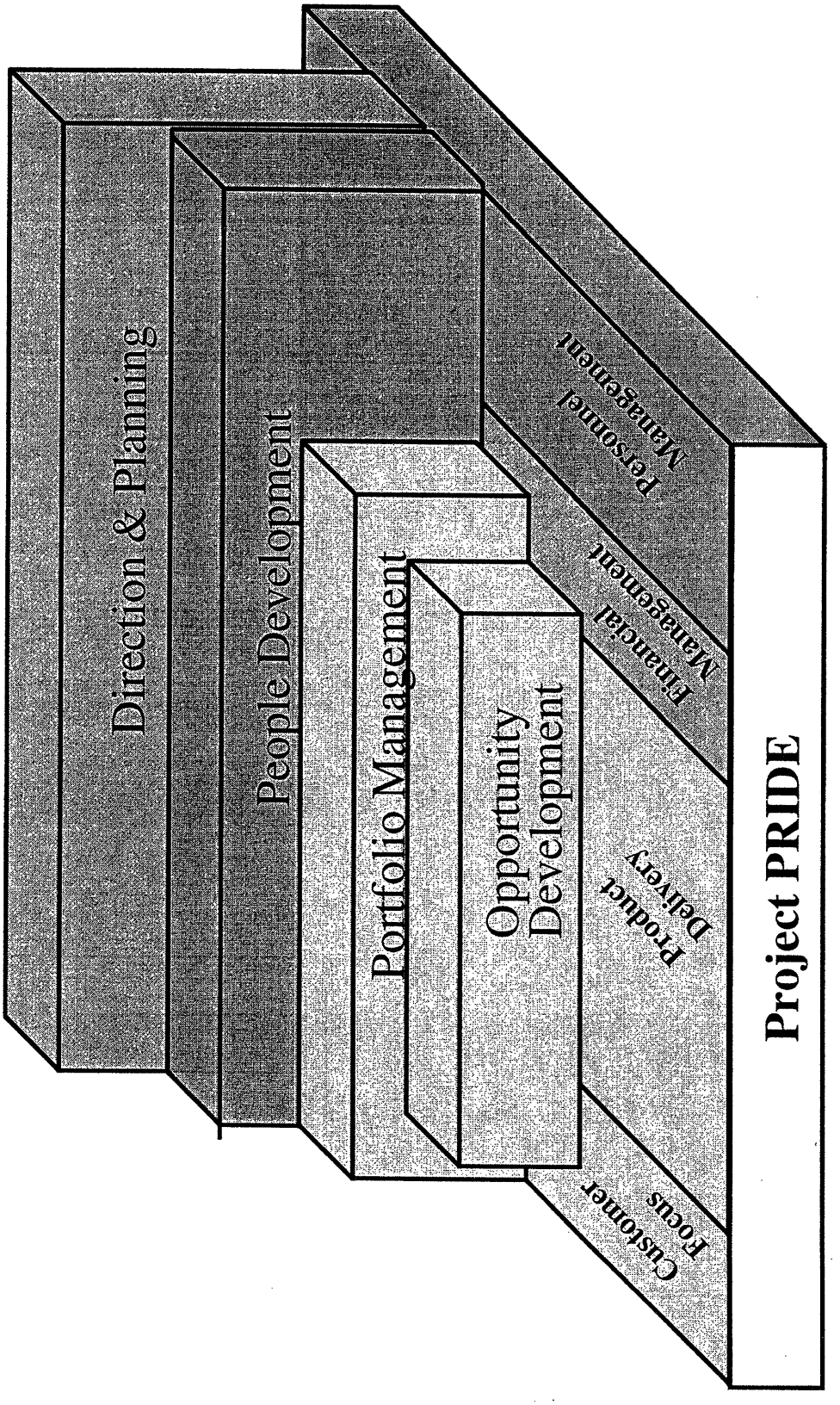
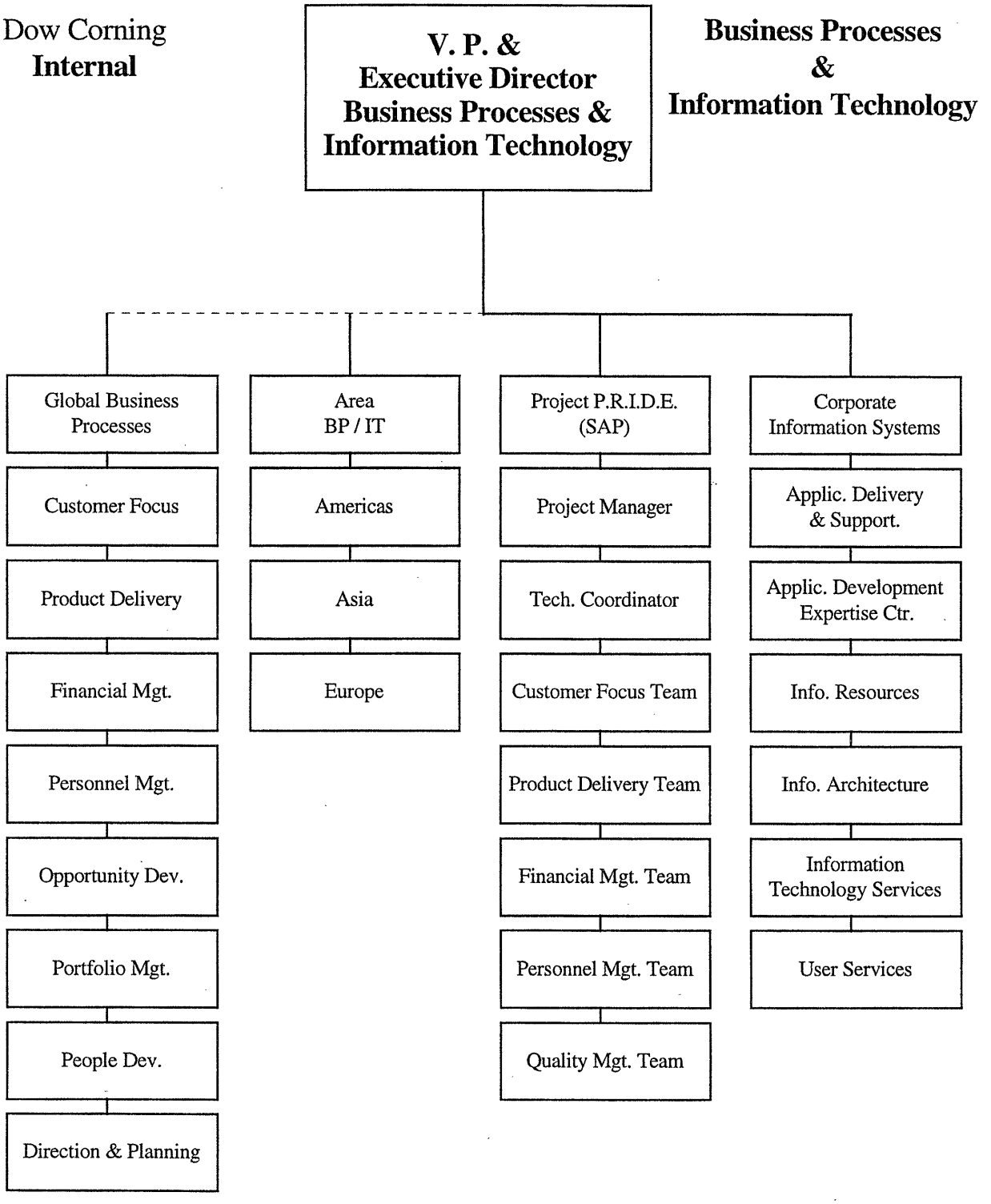
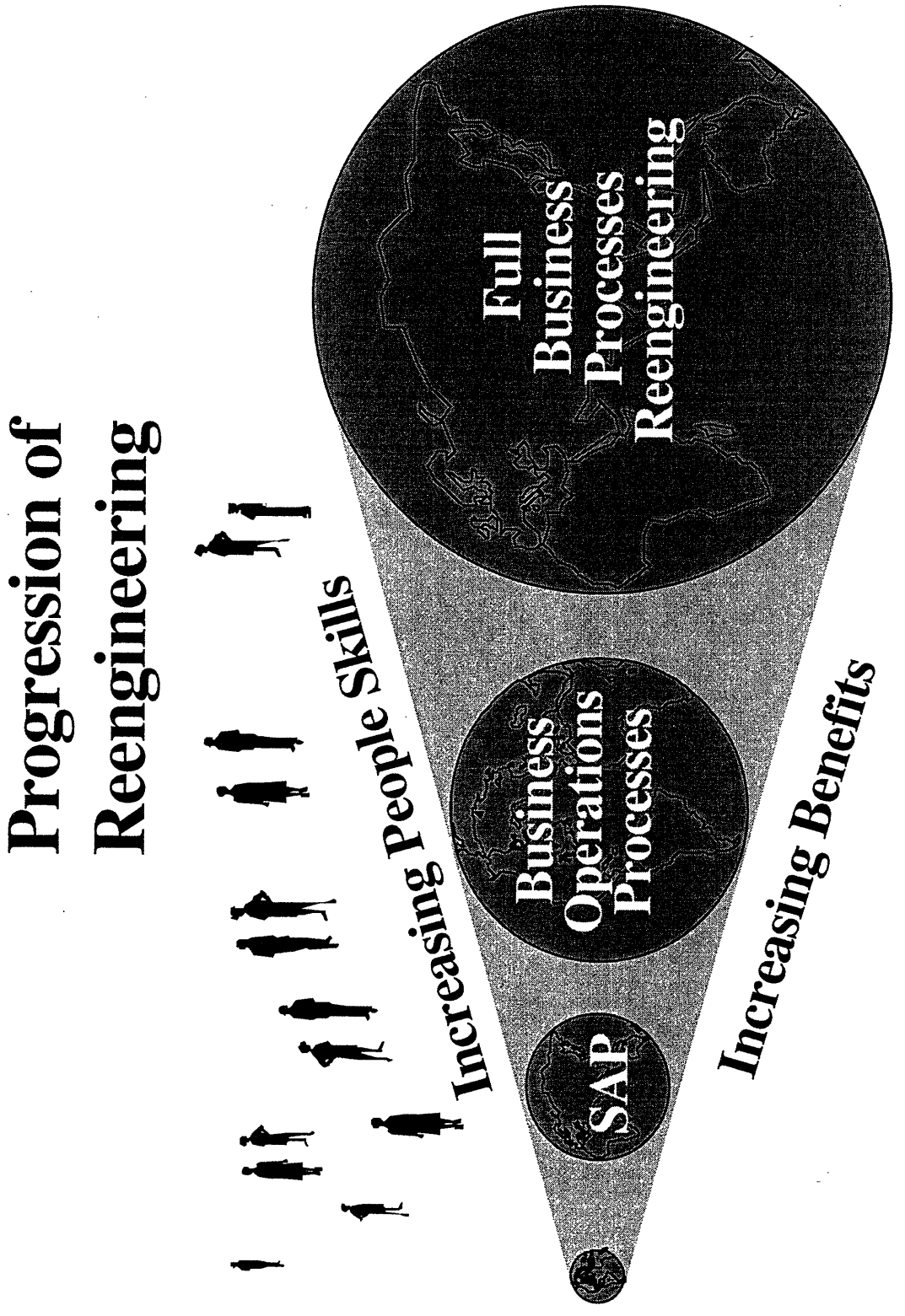
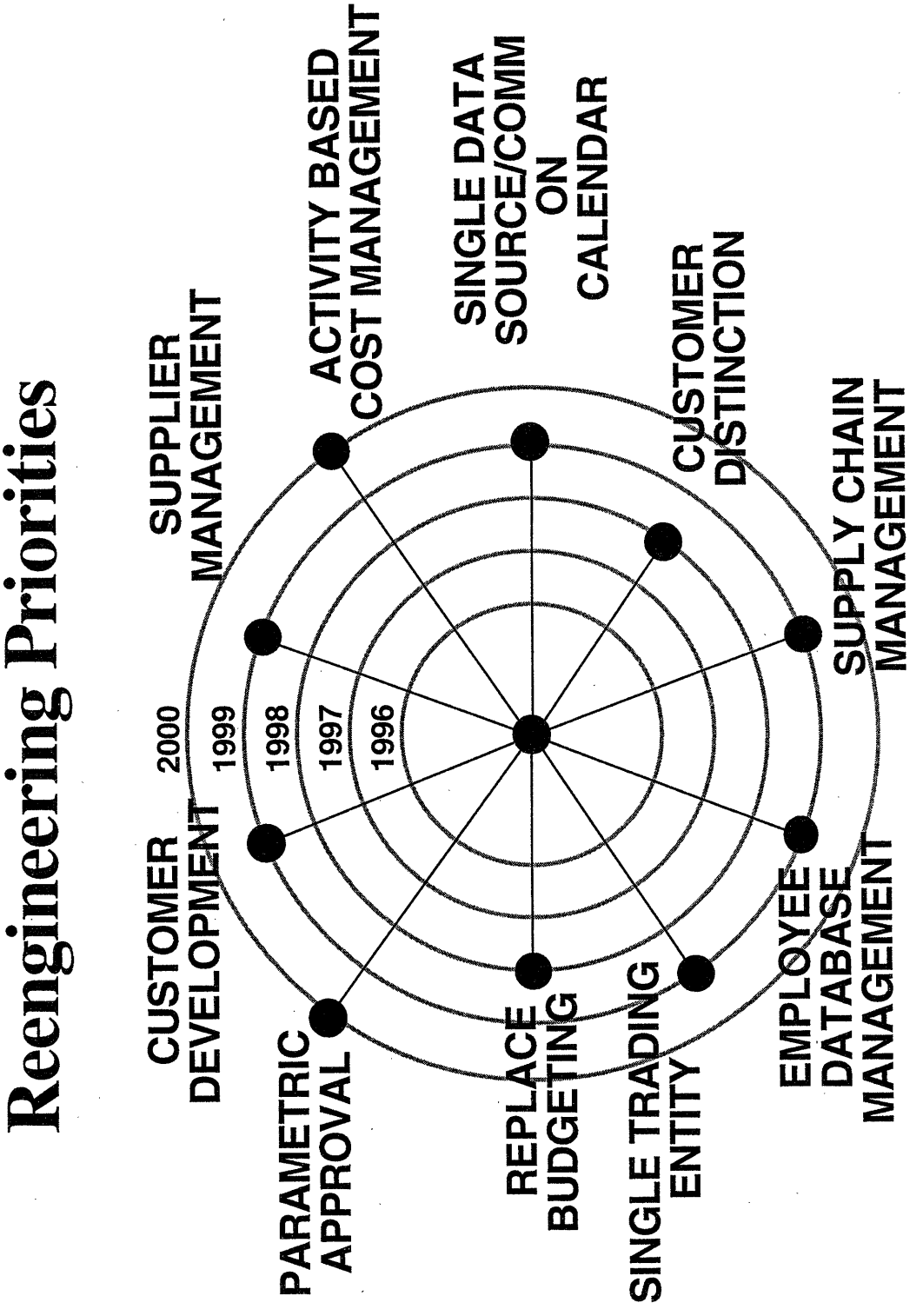


Exhibit B-2


Dow Corning
Internal
V. P. &
Executive Director
Business Processes &
Information Technology
Business Processes
&
Information Technology
Global Business Processes
Customer Focus
Product Delivery
Financial Mgt.
Personnel Mgt.
Opportunity Dev.
Portfolio Mgt.
People Dev.
Direction & Planning
Area
BP / IT
Americas
Asia
Europe
Project P.R.I.D.E.
(SAP)
Project Manager
Tech. Coordinator
Customer Focus Team
Product Delivery Team
Financial Mgt. Team
Personnel Mgt. Team
Quality Mgt. Team
Corporate
Information Systems
Applic. Delivery
& Support.
Applic. Development
Expertise Ctr.
Info. Resources
Info. Architecture
Information
Technology Services
User Services


Progression of Reengineering
Increasing People Skills
Increasing Benefits
SAP
Business Operations Processes
Full Business Processes Reengineering


Reengineering Priorities
1996
1997
1998
1999
2000
SUPPLIER MANAGEMENT
ACTIVITY BASED COST MANAGEMENT
SINGLE DATA SOURCE/COMM ON CALENDAR
CUSTOMER DISTINCTION
SUPPLY CHAIN MANAGEMENT
EMPLOYEE DATABASE MANAGEMENT
SINGLE TRADING ENTITY
REPLACE BUDGETING
PARAMETRIC APPROVAL
CUSTOMER DEVELOPMENT

Information Technology Competency Centers

I/T COMP. CTR.	KEY ACTIVITIES	PRINCIPAL DELIVERABLES
Security	• I/T security policies & standards • Business continuation planning • User access: applications, networks, platforms; databases	• Define security framework: Project PRIDE, client/server applications, Internet
Information Technology (I/T) Skill Development	• Ensure computer literacy • Coordinate I/T training leaders • Maintain listing of I/T subject experts	• Define and maintain curriculum
Office Tools	• Standards for electronic office tools	• Lotus notes & Internet pilots • Improved C/S Enterprise Office Sys.
Knowledge Delivery & Scientific Computing	• Decision support, expert and exec. information systems • Numerical intensive computing • Neural networks • Ensure decision support systems standards	• Articulate portfolio of technologies
Application Development	• Client/Server (C/S) development & continuous improvement infrastructure • Project PRIDE implementation and continuous improvement • Legacy systems outsourcing • National language support	• C/S stds. guidelines, SDM & tool kit • SAP standards guidelines & release management strategy • EDI integration with SAP software • Global outsourcing strategy • National language capability
Network	• Network standards & configuration • Voice services	• LAN and WAN services
Hardware & Operating System Software	• Hardware standards & configuration: servers; workstations • I/T asset management	• Define workstation configuration standard
Information Management	• Information warehouse strategy & standards • Document management capabilities • Database management systems • Process data repository administration	• Document management solution • Global C/S repository strategy • Information warehouse strategy • Sybase versus Oracle decision • Taxonomy framework
I/T Architecture	• Architecture definition, strategy, standards and communication • Principles & methodologies for managing new technologies/tools • Client/Server infrastructure	• PRIDE technical foundation • Client/Server architecture • I/T decision making methodology for technologies, tools
Manufacturing Process I/T and Control	• Establish standards & expertise for automated data collection, process control, laboratory information systems; mfg. execution systems	• Generic process control & mass balance methodology • ADC, MES, LIMS implementation
I/T Standards Methodology	• Define process for standards development and adoption • Ensure I/T standards awareness	• Define standards review/approval process • Identify awareness plan