

BOSCH

Multiple Information Systems Coping with a Growing and Changing Business: Robert Bosch Corporation

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■ Global Information Technology Issues Facing Dr. Eggenesperger and Don Chauncey

Dr. Eggenesperger, Chief Information Officer (CIO) of Robert Bosch GmbH, acknowledged that there were some challenges in implementing SAP R/3 across the organization. This Enterprise Resource Planning System (ERP) system was expected to address global business needs and electronically link customers and suppliers. The corporate information technology (IT) division decided to standardize on use of SAP R/3 during 1995, and by 1999 there were 20,000 SAP R/3 users in Europe alone. However, the implementation was not uniform across Europe. These non-uniform information systems met the company's requirements but were costly and wasted resources. The Board of Management of Robert Bosch GmbH stated that the implementation of information systems was not acceptable and did not meet corporate requirements arising out of increasing globalization. In order to meet the requirements, Dr. Eggenesperger considered the following strategic options: standardize ERP approach within the entire Bosch group, implement a domestic ERP approach for each country, or implement product-division based ERP approaches within the global operation. Each of these options provided various advantages and disadvantages to the corporate IT division (QI) and the corporation as a whole. In addition to the requirement for a corporate strategy, there were requests to modify the IT infrastructure in several domestic markets.

Don Chauncey, the CIO of the U.S. operations (Robert Bosch USA, RBUS) had to decide whether to continue with the current variety of information systems or to shift to a uniform SAP R/3 system

for all the divisions of RBUS. During 1999, many different information systems developed by multiple vendors were implemented throughout RBUS. Some of these systems were not functioning well and there was pressure on Don to make changes. For example, the software supplier of the financial system announced that they would support the AS/400 system only until the end of 2001. The Human Resources (HR) department recommended that PeopleSoft would be their choice to address the payroll/human resource needs. Changes were also required in the logistics area at the plant level. Krish Kumar, Director of Corporate Information Technology (CIT) for the Automotive Original Equipment Division (UO), was planning to replace the eleven non-integrated systems at the UO's plants in order to address customer needs. Mike Bieganski, Vice President, Information Systems and Services, of another division (K1) had already implemented the SAP R/3 system in his plants successfully, and believed that its ERP system exposed problems as they happened at various parts of the business cycle and made it possible to stay coordinated every day.

During August 1999, Don proposed implementing SAP R/3 in the Financials (FI), Human Resources/ Payroll (HR), and Logistics areas in order to address business needs. The executive committee that was in charge of approving this proposal put it on hold and asked for additional information on the project cost drivers. Don, as the CIO of the domestic level organization, was faced with the decision to either stay with the multiple information systems or champion implementing SAP R/3 throughout RBUS. He was unsure which of these information technology (IT) strategies would be most effective in coping with the growing and changing business of RBUS^a.

■ Global Organizational Structure of Robert Bosch GmbH

Introduction

Bosch is a name known throughout the world for many of its products. These include, for example, electrical and electronic automotive equipment, private and public communications technology, power tools, household appliances, and thermotechnology, as well as automation technology and packaging machines (Figure 1). The small "workshop for preci-



Figure 1:

sion mechanics and electrical engineering" which Robert Bosch founded in Stuttgart in 1886, and which soon began to specialize in ignition systems for motor vehicles and engines of all kinds, had become the Robert Bosch GmbH (Robert Bosch Limited Corporation). This company operates worldwide and is one of the largest companies in the Federal Republic of Germany in terms of turnover, which amounted to DM 50.3 billion in 1998. Appendix 2 gives an over-

^a Appendix 1 provides a time line with key events/milestones.



Figure 2:



Figure 3:

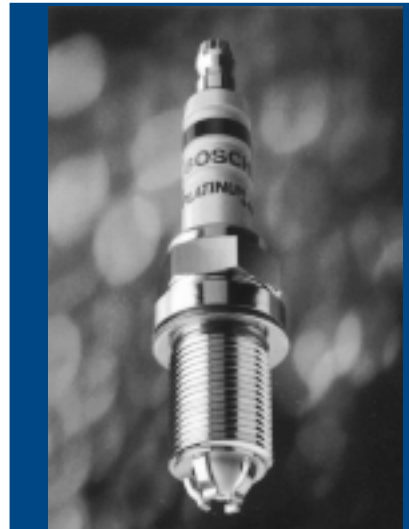


Figure 4:

view of some key business figures for the ten year period through 1998.

The Bosch group differed from other companies not just in the breadth and variety of its product range, but also through its constitution under company law. Although RB GmbH was expected to produce profits, the majority shareholders (92 percent) were the Robert Bosch Foundation, which has been one of the largest non-profit industrial foundations in the Federal Republic of Germany since June 1964. The foundation used the funds it received from the profits of Robert Bosch GmbH for public-benefit purposes. The areas sponsored by the foundation

mainly included health care, international understanding, and welfare, as well as culture and education.

The international orientation of Bosch started around the turn of the twentieth century. The first agencies were set up abroad at this time. The Bosch Group employed approximately 189,500 people, nearly half of whom worked outside Germany. It had around 250 subsidiaries and associated companies in 48 countries, including 37 joint venture companies. A total of 185 manufacturing sites, 142 of which were located outside Germany, supported its international activities.

Organization Structure and Products

The global operations were organized using business sectors (UB - Unternehmensbereich) under which product divisions (GB - Geschäftsbereich) operated. This structure had not changed since 1968.

The most important business sector in the Bosch Group was for producing automotive equipment and accounted for 63% of total sales during 1998 (Figure 2 ; Figure 3; Figure 4). A number of different product divisions were responsible for the numerous products in the automotive

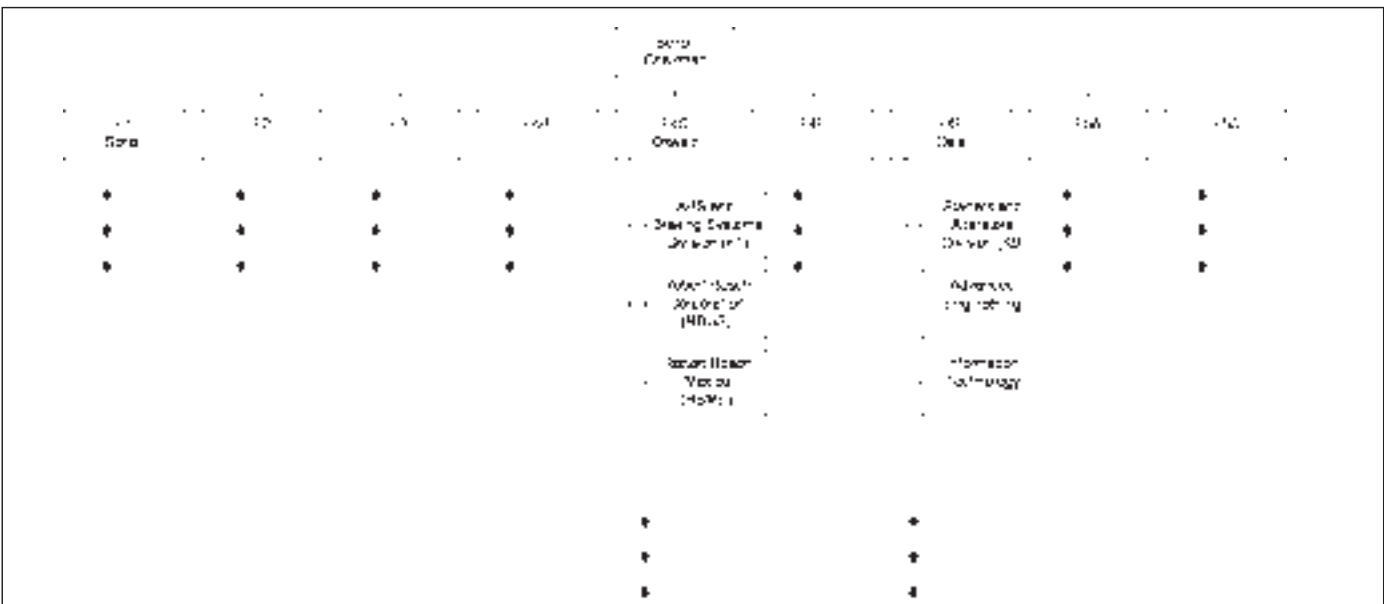


Figure 5: Organization Chart of the Board for the Robert Bosch GmbH (simplified)

business sector. Division 1 (K1) dealt with Antilock Braking Systems (ABS) and Braking Systems. In this area Bosch was the first to bring ABS to the market in 1978. Division 2 (K2) has operated the Automotive Lighting business since 1999 as a joint venture with Magneti Marelli. Division 3 (K3) dealt with Gasoline Engine Management and products in this area include engine management for spark-ignition engines, fuel systems, fuel filters and exhaust gas sensors. Division 4 (K4) dealt with products such as windshields, wiper and washer systems, engine-cooling-systems and climate-control components. Division 5 (K5) produced Diesel Fuel Injection equipment. Division 6 (K6) had products such as cockpits, vehicle electrical system (PowerNet), display systems, locking and closure systems, vehicle security systems, multimedia systems, and climate control. Division 7 (K7) produced mobile communication systems such as car radios, navigation and driver-information systems. Division 9 (K9) produced starters and alternators. Divisions K1 to K7 and K9 sold their products to outside customers, comprising mostly car manufacturers. In contrast, Division 8 (K8) sold its products to internal customers within Robert Bosch GmbH and produced semiconductors and electronic control units. The Aftermarket Products Division (KH) acted as a trading unit for automotive replacement parts and accessories.

A second sector produced communication technology. This sector has shrunk to Aerospace Technology and Security Systems, since the larger pieces of the Pri-

ivate Network and Public Network business were sold. The third business sector was called Consumer Goods and included Power Tools, Home Appliances and Thermotechnology divisions. The fourth business sector produced Capital Goods and was divided into Automation Technology and Packaging Machinery divisions.

The Chairman of the Board of Management of Robert Bosch GmbH was Dr. Hermann Scholl. Each member of the board had basically equal rank. Figure 5 shows an abbreviated organization chart and identifies the position of executives relevant to this case study.

Each board member supervised one or more divisions and all the board members were based in Germany. For example, Robert Oswald was in charge of the worldwide plants that belonged to the K1 division. Each division was headed by a team of one technical and one financial executive, and had the responsibility for product development, marketing, sales and operation of the manufacturing plants worldwide. Occasionally, a plant in a country might be shared between several divisions since it might be producing only a small volume of products. A two-person team consisting of technical and financial managers headed each plant. The critical success factors for the plants were cost and quality.

Global Operations

The products produced in the plants differed since individual governments imposed their own standards. For example,

car headlights in France must be yellow in color, whereas they must be white in the US. In Canada, the lights must be on at all times. Emission standards differed within and across countries. Electrical systems in North America were based on 110 volts, while in most European countries, 220-volt systems were standard. Traditional practices also varied across nations; for example, the place where the engine was positioned in the automobile. There were significant differences in distribution channels among the countries, leading to the delegation of marketing functions to national subsidiaries. Many of Bosch's overseas operations were initially founded as dedicated sales and distribution companies. Invariably, local development and manufacturing facilities were soon added, to supply their national markets.

During the 21st Century, Bosch's activities related to development, manufacturing, sales, distribution, purchasing and customer service were expected to form a tightly woven global network. In view of the need for integration among the different divisions, Dr. Scholl, the chairman of Robert Bosch GmbH emphasized the need to increase efficiency, the implementation of a global purchasing program, and the increased use of the Internet and electronic marketing systems within the organization (Appendix 3). He and the Board of Management expected the Corporate IT division to make significant changes in its strategies, operations and implementation of information systems so as to meet customer needs and reliably fulfill all agreed upon work and services.



Figure 6 – Photo of Headquarters



Figure 7 – People Working at QI

■ Strategies of QI, the Corporate IT Division

Top Management's Direction to the IT Division, QI

The pressure on the corporate IT division to change started in 1994, when the Board of Management gave it two mission statements. First, the IT division had to operate like an external IT provider and meet or exceed the same benchmarks expected of these providers. Second, it had to be a leader, setting policies, procedures, and standards for IT throughout the Bosch Group. The IT management team created the QI (Querschnittsbereich Informationsverarbeitung - Division for Information Technology) business unit in order to address these requirements

Management of QI

Dr. Eggensperger was the chairman of the QI executive management team and head of the unit, Mrs. Bauer took care of the application systems unit, and Mr. Mierzwa was responsible for the business support unit functions, consisting of controlling, accounting and IT-purchasing. IT departments were formed in every location and helped internal customers. The IT personnel were charged with knowing the processes used by their customers and recommending the technology and systems that would most efficiently improve operations.

The mission of QI was to improve the productivity and competitiveness of the company. The goals of QI were:

- customer orientation,
- standardization,
- efficiency, and
- planning for the future.

In addition, QI was responsible for supporting the applications and IT units for all the Bosch subsidiaries worldwide. This responsibility comprised the management and coordination of projects as well as the realization and marketing of standards, both in the hardware and in the software area.

QI's Decision to Implement SAP R/3 -Strategy throughout the Global Corporation

Robert Bosch began using SAP R/2 for accounting in the early 1980s. The company's top management decided that

implementation of an SAP system across the organization would address the business needs adequately. Teams initiated SAP R/3 implementation in different plants and locations. During 1995, FI/AM systems (Financial and Asset Management) were implemented, serving 815 end users. The number of end users increased to 1,486 by 1996 when nine financial systems in different units were implemented. In all, 17,500 end users were served by more than 50 systems across Europe by 1998. Most of the implementations were driven by current local demands, the need to achieve Y2K-compliance, and the need to implement the EURO as the common currency within the European Community. A press release which characterizes the activities of the Bosch group in implementing SAP R/3 is shown as Appendix 4.

Issues in Implementing SAP R/3 Uniformly Across European Locations

Due to QI's initiative, by 1999, many Robert Bosch locations in Europe were using SAP R/3. However, the systems were not implemented uniformly. The non-uniform information systems met the company's requirements, but were costly and wasted resources. In the age of globalization, the company had to fulfill requirements such as:

- international co-operation (production and development alliance, Global Sourcing etc.),
- electronic link for customers and suppliers (E-Business),
- flexibility in assigning business units,
- modern, easy reporting (example: "What was the total turnover Bosch produced selling product A to customer B?"), and
- the ability to close the books for all Bosch operations and report the results within 5 days.

The Board of Management told the QI management team that the current IT implementation was not acceptable since it did not meet these business requirements.

QI's Response to Standardize Implementation of SAP R/3 Systems

QI embarked on a top-down approach to implementation and was developing a common product for use in every plant location. Mrs. Bauer, who was responsible for the software applications unit in QI, explained how QI was responding to the request from the Board of Management:

We are now developing a common product for use in every plant location. Within our RB/3W product the processes will be the same. We are not doing this in a closed forum. We have included people on the project team that will standardize the configuration. We have five pilot plants and about 170 people involved in defining the processes. To harmonize processes, there will have to be changes. Not everyone's processes will fit. A benchmark will be set in the end. The experts in these areas will determine the processes, and communicate with the various plants. By the time it is finished, everyone will know what is coming and what will be in the product.

To achieve improvements we are trying to make the end-users think about the future business needs, and to really change by establishing measurements. For example, we have set goals for the ERP project that every process is 30% faster, or has 30% fewer steps. We want to establish a very formal process with SAP to establish KPI (key process indicators). That means that we need the strategic goals from the board of management, like achieving good customer relations. Once we get those, we have to break them down into operational goals. We then must establish measurements to show process improvements. Before a new process is accepted, it should be simulated to see if the measurement is improved. New processes will be accepted only if they improve performance.

"What's this now? Just another thing that makes life more complicated!" I could hear one or the other person moan: "Our plant is already well optimized!" True - for the individual site

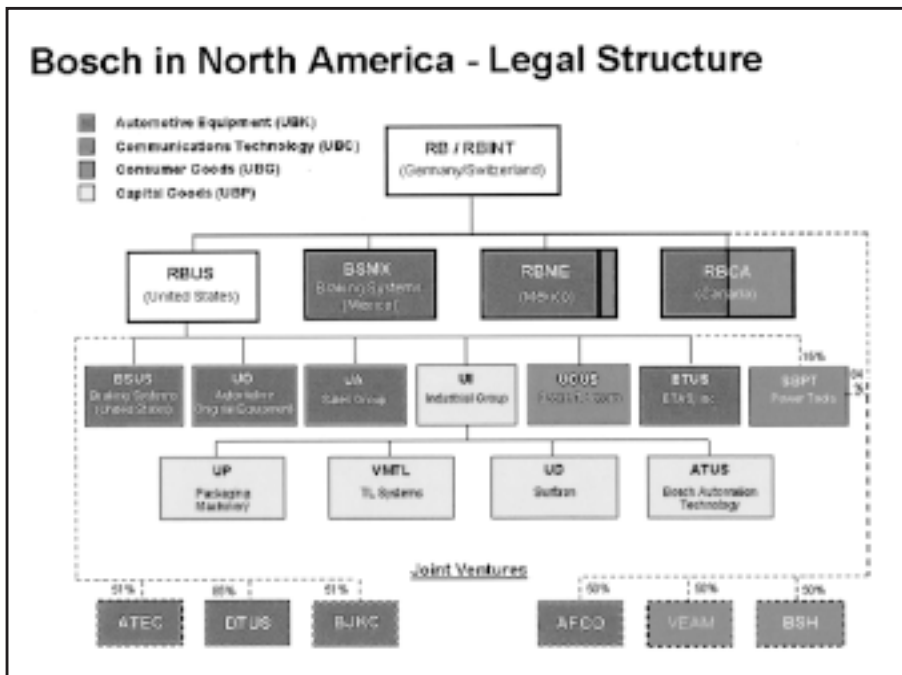


Figure 8: Organization of Robert Bosch North America, Legal Structure

and for today's requirements. But what about the company-wide situation, and are today's processes the right ones for our future success? Finally I would like to define the term "standardization", as I understand it. For me, standardization does not mean leveling down differences. No, standardization means getting together with the experts to determine and introduce the best process for a certain procedure (e.g. the kanban system) or the best system for a certain product (e.g. document management).

Decision facing the CIO of QI, the Corporate Division

A lesson QI learned during this project was that it might not be appropriate to standardize at the plant level. The plants were heterogeneous between the different divisions and were not similar. QI's team members suggested that standardizing SAP R/3 at a product-division level might be a better approach, since each division will be treated as an independent enterprise within the business sector. These implementation approaches were driven from a European point-of-view and issues arising out of overseas activities were not actively considered in formulating these strategies.

Dr. Eggenesperger, the CIO of QI, identified three major IT implementation options at the corporate level: standardization of the ERP approach within the entire Bosch group, implementation of product-division based ERP approaches within the global operation, or implementation of a domestic ERP approach for each country. He had to decide which option to choose and how it would impact the company's performance.

Implementing ERP approaches within each country had its own challenges and we will now focus on the issues faced by Don Chauncey, the CIO of the U.S. operations.

■ Organization Structure of Robert Bosch Corporation (RBUS)

As shown in Figure 8, Robert Bosch GmbH and Robert Bosch Internationale Beteiligungen AG (RB/RBINT) wholly owned their U.S. subsidiary, Robert Bosch Corporation (RBUS). The Chairman and CEO of this company was Robert S. Oswald. RBUS had a total of 55 manufacturing plants, corporate and sales offices, technical centers, and distribution centers in 18 U.S. states. During 1998, it employed 12,400 employees and had annual sales of \$3.6 billion. RBUS's prin-

cipal line of business was manufacturing and selling various highly engineered components and systems to North American automotive and heavy-duty original equipment manufacturers (OEMs) and related aftermarkets. Appendix 5 provides an extract from the RBUS 1998 Annual Report. It provides key measurements for the RBUS corporation and the other units in North America.

In the USA, the K1 unit (BSUS in Figure 8) was formed when RB purchased the AlliedSignal braking division during 1996. It was headed by Mr. Weckerle and had sales in excess of \$1.5 billion during 1998, producing brakes, rotors, master cylinders, antilock braking systems, etc., for passenger cars, light trucks and medium trucks. The K1 unit was headquartered in Southbend, IN.

UO was the largest business division, producing about 70% of the sale in the USA and had its headquarters at Farmington Hills, MI. Krish Kumar, the Director, CIT for UO, described the products and processes in UO as follows:

UO is an RBUS division and has primary responsibility for all sales of K3 to K9 product lines in North America. UO has about \$1.5 billion in sales and has four major plants in Charleston, Anderson, both in South Carolina, Juarez, Mexico, and Albion, Indiana. In the near future, RBME, in Toluca, Mexico will become part of our division producing K4 and K9 product lines. Our growth has been significant during the last few years. DTUS, part of the diesel business, will also become part of the UO division in the near future. From the information systems perspective, we have brought DTUS onto our systems already, but they will be integrated from a business perspective in the future.

RBUS included an aftermarket business, UA, and a group of capital goods companies called UI. The latter included UP, a packaging equipment company, ATUS, an automation technology company, and others. UCUS was part of the Bosch Telecom business. ETUS, a small software development business for engine management systems was formed in Ann Arbor in April 1997. S-B Power Tool Corporation (SBPT) produced parts in the power tools sector. There were a number

Issues Facing the IT organization at RBUS

Management

The Corporate Information Steering Committee (CISC) was composed of the CEOs and IT-managers of the major units of RBUS, K1, UO, UA, and SBPT. Figure 9 shows the management structure of the IT operations in the North America. Figure 9: IT Management Structure in North America (simplified)

The CIO of RBUS, based in Broadview, IL, was Don Chauncey and his division supported the rest of the organization for its financial, human resource, and payroll functions. Under him, Kamran Ashraf was the Director of Corporate Information Systems (CIS). Mike Bieganski, Vice-President of Information Systems and Services for the K1 unit was responsible for developing and maintaining the information systems that were used at the different plants, such as logistics, supply chain management, customer order systems, production planning, manufacturing, etc. Krish Kumar, Director, Corporate Information Technology (CIT) for UO, was responsible for developing and maintaining the information systems that were used at the different plants. All three of the CIOs reported to the financial executives of their divisions. The multiple information systems used during 1999 by RBUS, K1, and UO are described next.

IT Systems Used at RBUS

The IT applications implemented in the different divisions of North Ameri-

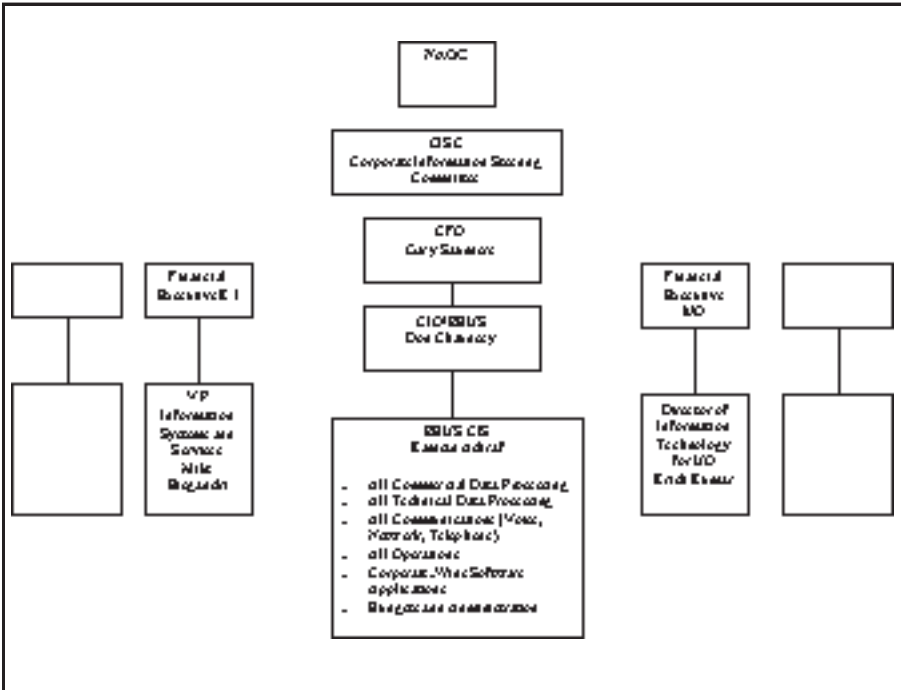


Figure 9: Management Structure in North America (simplified)

of other companies that had been formed as a result of joint ventures and are shown in the bottom portion of Figure 8. These included Automotive Electronic Control Systems, Inc. (ATEC), a joint venture with UNISIA JECS, which manufactured automotive equipment. Diesel Technology Company (DTUS), a joint venture with Detroit Diesel, was a large heavy-duty diesel business. BJKC-Americas Corporation (BJKC) was a Japanese joint venture with Jidosha Kiki Corporation. Associated Fuel Pump Systems Corporation (AFCO) was a joint venture with Nippondenso, Inc. SBPT and Vermont American Corporation (VEAM) formed a joint venture in the power tools sector. BSH Home Appliances L.P. (BSH) was a joint venture with Siemens AG. As these joint ventures and acquisitions were made, RBUS was growing rapidly and the corporate office, in which the CIO's office was a department, was constantly adding additional services in support of the new businesses. The Bosch company continues to be a very fast moving and fast changing organization.

The NAOC (North American Operating Committee) is the top-level management committee and is made up of the CEO, the Chief Financial Officer (CFO), the President of K1, the President of SBPT, the President of UA, the President of UO, and an executive from Robert

Bosch Mexico (RBME). They met on a monthly basis to review major issues having regional impact. The NAOC wanted RBUS to maintain a leadership position in quality, delivery, innovation, and price. In addition, it remained committed to continuous improvement process (CIP), focusing on efficiencies and processes that allowed the company to offer technologically superior products at competitive prices. The NAOC appointed a Corporate Information Steering Committee (CISC) in order to monitor the strategic direction of information technologies and ensure that it was aligned with both its own business needs and those of its customers.

IT Applications (examples)

SBPT and K1: SAP R/3 (except F/A: Computron)

UA: J.D. Edwards

UO-Plants: PRMS (UO-Version)

RBME: PRMS (RBME-Version)

DTUS: PRMS (HR/Payroll Peoplesoft)

Financials mainly centralized: GL, F/A, A/P (Computron), A/R (MSA)

Human Resources centralized: HR/Payroll (MSA)

Figure 10: IT Applications in use during October 1999

can business are shown as Figure 10.

Don explained the evolution of information systems at different locations as follows:

When I was hired, RBUS had implemented PRMS¹ in the smaller divisions, and I helped finish the implementation in the UO organization. Today we are running our factories on PRMS. There are some modules of PRMS that are very innovative, but it is basically an MRP II (Manufacturing Resource Planning) system.

The major plants of UO are in Charleston and Anderson, South Carolina. I hired Krish Kumar, who is now the Director of Corporate Information Technology for UO. I sent Krish to the Charleston plant because he was a PRMS expert. We implemented it successfully. The UA division wanted software that would fully meet their requirements and selected the J.D. Edwards System that fit the distribution needs of their division. Also RBME was moving to PRMS from a mainframe, as had the UO organization in the US. So PRMS is used extensively in our company and we have significant expertise in its implementation. PRMS was the Bosch standard here as well as in other parts of the world and the QI standards allow Bosch businesses to remain on PRMS. However when new ERP systems become necessary to replace PRMS, we want to select the new standard as SAP.

The PRMS system was used in the plants by UO, RBME, and DTUS. J.D. Edwards was used in UA. Both SBPT and K1 had implemented SAP R/3 systems. The financial systems for RBUS were implemented on Computron software. Don discussed the implementation of Computron in his organization:

The Computron Software was selected prior to my arrival to replace the existing mainframe financial applications. It has been used for our operations on the corporate level during the past years. It's a very innovative system. It includes workflow functionality, and allows scanning and indexing of documents such as invoices. On the AS/400, Computron is running G/L, F/A, A/P (General

Ledger, Fixed Assets, and Accounts Payable). We completed the conversion to Computron in August 1998. In the process, we eliminated some old systems and significant costs associated with them. We also eliminated a DOS/VSE mainframe and its cost.

The conversion process began about six months after Don joined the company and ended in August of 1998. Don concluded the description of the systems by stating:

We were driving this, and accomplished it credibly because we understood the business process and were able to put all acquired companies on to our systems. We are now almost entirely on AS/400 systems including PRMS, Computron and J. D. Edwards. After discussions with Computron they finally agreed that they would support the AS/400 version of their software until the end of 2001. They have other customers who had Y2K issues and they want to support their customers through Y2K so as not to further add to the workload. The only mainframe system remaining are the Human Resource/Payroll and the Accounts Receivable System.

As shown in Figure 10, RBUS had outsourced the operation of payroll application to May & Speh (MSA) while maintaining the software support internally. The same was true for their A/R (Accounts Receivable) systems. They used an MVS mainframe to process the payroll application. All payrolls for RBUS used this system except DTUS, which ran its payroll on the PeopleSoft system, and SBPT, which used a full outsourcing provider. Don talked about the issues requiring changes to the payroll and human resource system:

Though we had changed every other system in the company in the past five years or less, we had not changed the payroll/human resource system. In fact our payroll system is an old mainframe based system. It has a human resource component but the users indicate that the system doesn't have the human resource capabilities that are required. The Vice President of Corporate HR wants very urgently to implement a new human resource system. About a year ago he requested a

study for a new system.

During 1998, Don was looking at PeopleSoft for the human resource system replacement since SAP did not have a well-established system. The human resource department, along with Kamran, did an analysis of various packages. Don explained:

At that time PeopleSoft was the leading HR/Payroll software in the US market and several of the human resource personnel in our divisions had prior experience with this software in other companies. We therefore considered Lawson², SAP, and PeopleSoft. Our people were leaning towards PeopleSoft, but I had concerns whether Germany would accept this decision. At that point I met with Dr. Eggensperger in 1998. He said that in order to make a decision on this issue he would need a formal proposal.

In February 1999, at a meeting between RBUS/CIO Don Chauncey and Mrs. Bauer, QI/LA, it was decided that an SAP R/3 project including FI/CO and HR would be implemented at RBUS. One reason for starting with FI was the fact that HR generated postings to the General Ledger (part of the FI function). If the postings were not integrated across the companies in RBUS, a significant effort would be needed to create interfaces for the FI function. By starting with the FI project, standardization could be implemented on the Bosch chart of accounts for companies in RBUS. Two FI experts from QI, Mrs. Reinhardt, who had implemented the FI systems in the UK and Mr. Bauer, who had done a similar implementation in France, helped RBUS create a project request during March 1999. At the same time, QI members from the HR area were in the USA for one week. Both FI and HR suggestions were reviewed with experts from SAP. Also, Mr. Schlaefler and Mr. Kleiser from QI were in the US to support the conversion of logistic processes to SAP R/3.

Kamran Ashraf made a comment about investing millions of dollars in a large SAP R/3 system. He thought it should be handled like a venture capital investment³:

If I am going to invest the money, I

would like to know what I'm getting for it and I would like to know what is the risk associated with it. I mean this is just like another venture capital investment.

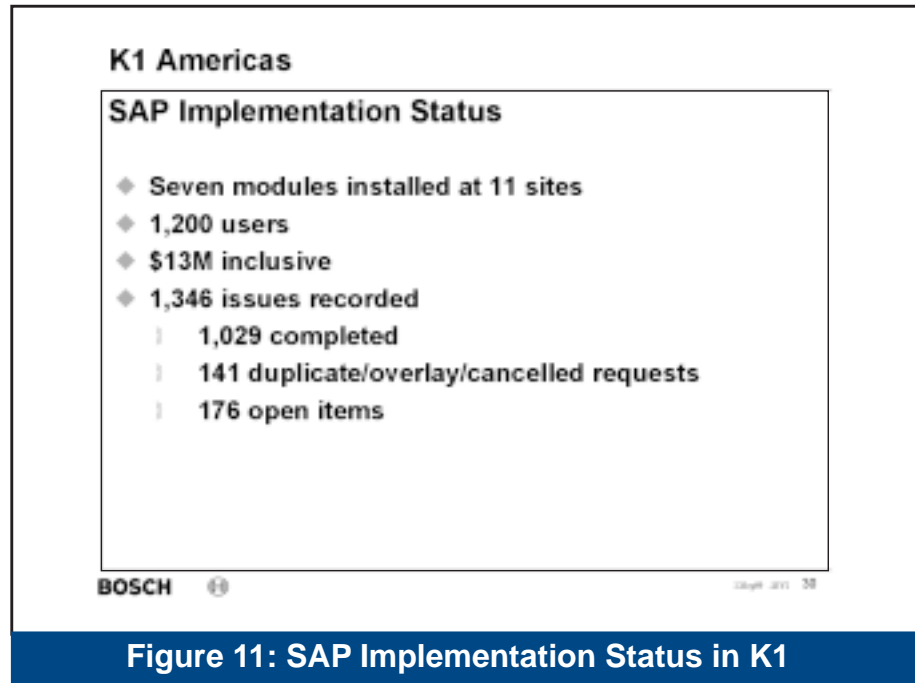
IT Systems Used at K1

Mike Bieganski, Vice President, Information Systems and Services, had implemented a SAP R/3 system during the period 1997 to 1999 for the K1 division in the USA. This division had been forced to change to a new system since AlliedSignal had software running on a mainframe for which the source code was not available, so the IT organization was not able to add or change any of the source code to make it Y2K compliant. Mike was hired in 1997 to implement the SAP project so that the system could be replaced. As a result of the SAP R/3 project, data centers were consolidated with a remarkable effect on cost reduction, Y2K issues were resolved, and seven modules were installed at 11 sites. These modules covered materials management, sales and distribution, production planning, quality management, and parts of financial accounting and controlling functions. A total of 1,200 users were impacted by the changes. Figure 11 shows the status of the K1 SAP project. Decisions were made quickly since time pressure to meet the Y2K deadline was high and the plant management strongly supported the conversion to SAP R/3. This was the first successful implementation of SAP R/3 modules in the USA.

According to Mike, the culture of RBUS was more long-term focused and was more conducive to implementing the SAP R/3 system globally. He talked about the culture at RBUS:

Bosch is very much long term focused and expects to stay in business for the long run. They invest heavily compared to other companies. They have funds to buy new machinery and don't prolong the life of old machinery. And they are also very conservative. At Bosch, the priorities are quality #1, delivery #2, and cost #3.

He believed that implementing SAP R/3 in his division was a difficult task since it took time for managers to realize the benefits of implementing an ERP sys-



tem. He said:

Let me tell you what the difference is in our business today versus a year ago before SAP. I went to our St. Joseph, Michigan plant and I was talking with the cost accounting person and I asked her about SAP. She had it now for 9 months and she said, "I hate it". And I said, "Why is that? Is it because we used to have a nice way to put a bill of material in and now you have to go through 4 or 6 screens, so the navigation isn't quite there and SAP is working on it?" She said, "Oh, no, that doesn't bother me. Earlier, as a cost accounting person, I had my own world there. Everything was wonderful and I booked what I needed to and then at inventory time, we figured out where to match up. I got together with the materials guy once a year and fixed our problems. But now the system is so integrated that I need to stay coordinated every day with the materials guy. I just hate that."

Mike stated that this example showed the benefit, the beauty, and the problem in implementing SAP since it is so integrated it's a "push down, pop up system." Any problem in the business is completely exposed. If there is a problem on the receiving dock, the shipping dock, or in the middle of factory, the system exposes the problem to other people and to management. That forces action to be

taken to solve the problem. He discussed the reaction of the Vice President of Manufacturing to the SAP system:

He is a former materials person so he understood MRP very well. He walked through the details of the SAP R/3 system and he loves it. The only thing he doesn't like is in the manufacturing world, when you make a sale, you book it to the general ledger. He would like to have some buffer there so that sales are not recorded immediately. But the financial people like it because at any point in time, any day, they can close the books and see all the accounts and it's very effective in exposing any problems in the product life cycle.

IT Systems Used at UO

The IT division at UO had approximately 59 people and reported to Krish Kumar, Director, CIT. His team had to work very closely with Don's group in Broadview, with the rest of the plants in UO, and with Mike Bieganski because UO's plants also manufactured brakes. The UO division had two lines of business, with about 60 % being produced in its factories and 40 % imported from Bosch plants in Germany, Brazil, India, Turkey or other countries. The value added to the consumer was based upon fulfilling orders with products produced

in UO's factories and by directly procuring the products from plants around the world. There was significant complexity in the latter process, as the products came from the internal supplier to UO's warehouses and were shipped directly to the customers. UO was responsible for the inventory, the delivery of the goods to the customer, and the engineering changes that occurred even though it did not fully control the manufacturing of the product. Krish explained the information systems that were used at UO:

Currently we are running the PRMS system for our manufacturing operations. We tie in to Broadview for the financial systems. We also have systems that were developed in-house that address the shipping, billing and invoicing functions. We have a system that ties EDI (Electronic Data Interchange) both to our customers and our suppliers. We have about 11 systems that address our total business cycle. The demand management system determines what we have to buy based on engineering data. Therefore, we tie the systems to the engineering piece of the organization, for example, the routing and bill of materials for manufacturing the product. Then we build the product using manufacturing methodologies. To build the products we need components and source these components from our domestic and foreign suppliers. After we have built the product, it is shipped directly to our customer. This involves maintenance of shipping, invoicing, and billing systems. Then we build a financial summary, for our internal reporting as well as for our external reporting, every quarter and give it to Robert Bosch in Germany.

Krish further explained that Electronic Data Interchange (EDI) systems⁴ were used to manage 90% of the demand. UO had 38 OEMs (Original Equipment Manufacturers) and each OEM might have 9 to 10 different plants where the products needed to be delivered. In addition, UO conducted EDI transactions with the top 135 of its suppliers. Therefore, the EDI system had to be tightly integrated with the manufacturing and demand management functions. In addition, UO used the EVA system (the order en-

try system in Germany) for demand management of international requirements. Krish explained how the different systems made it difficult to integrate the operations and meet customer demand effectively:

Because of the current non-integrated system solution, we have created pockets of implementation gaps between the functional departments, sales, engineering, manufacturing, distribution, logistics and financials. Not only do we have complexity in the organization, but also the old reporting methods add time to the production of performance information. Management is requiring us to position the applications to address business growth and increased complexity.

And further our customers are asking us to provide both total systems and modules. They want to reduce the number of suppliers. This brings in more complexity. We have to work closely with the OEMs. The whole system or module is integrated into the automobile, and we have to bring in our tier-2 and tier-3-suppliers and even our competitors at times. We need to insure that the design integrates with the rest of the components of the car.

He was enthusiastic about implementing SAP R/3 in his division. He did not believe that SAP R/3 would provide a complete solution, but considered it to be an opportunity to align the information systems in UO with business processes in order to support the requirements of his end-users. He stated:

Exploiting the information systems is where I see the benefit of the entire investment for Bosch in IT. Take for example the process of receiving an item, storing it, moving it to an assembly, and understanding the transaction costs of this process. Today we use multiple systems for these steps. With the current systems, I can't tie together some of the critical pieces of information. The existing systems are not aligned with the automotive vertical market. The result is that within the IT organization we are fighting fires constantly. The software does

not accommodate the growing and changing business requirements and we have to tell our customers that the system can't deliver the information they want.

Our end-users are asking for real-time information. I cannot have the IT associates function as program generators and developers anymore; they have to become business minded people helping their users by actively working with them and resolving their business issues.

■ Decision Faced by Don

Don created a strategic plan to implement SAP R/3 in the Financials (FI), Human Relations/Payroll (HR), and Logistics modules, as shown in Appendix 6. This plan assumed that SAP R/3 would be used for all the North American operations. The NAOC reviewed the plan during August and put it on hold. The committee was reluctant to commit millions of dollars for an implementation of SAP R/3 without additional information regarding the project cost drivers, specifically how much was due to:

- (1) "Have to do" items,
- (2) a corporate standard, and
- (3) need to improve processes.

There was pressure to reduce the spending on the SAP systems implementation. Robert Oswald wanted to know what the current running costs were versus the forecasted costs once SAP had been implemented. He also asked for estimates of costs to continue with the Computron system.

This directive seemed to be in conflict with QI's message to Don that "It is efficiency that is essential for QI not the total costs nor the number of employees." (Appendix 7). Don pondered whether he should continue maintaining the current multiple information systems or champion implementing SAP R/3 across all product-divisions of RBUS. Don assessed the situation:

We have all read in the Wall Street Journal about the large project failures in implementing SAP. SAP R/3 is a data hungry system. It is conceivable that without user backing, the implementation will flounder—the

users need to be involved and establish the process requirements. And overall, the business strategy needs to

drive the systems direction. We need to ensure that the users and management appreciate the complexity of SAP

and its future implications. The implementation can have substantial impact, particularly if we don't do it right.

Glossary/Acronyms

A/P	Accounts Payable
ABS	Antilock Braking System
AM	Asset Management is a module of the R/3 System which covers the functionality to manage the assets, especially the fixed assets of a company.
APO	Advanced Planner and Optimizer is a software product of SAP which complements the R3 system in terms of sophisticated planning methods.
AS/400	Application System / 400; an IBM computer system
ATUS	An automation technology company
BBP	Business-to-Business Procurement is a software product of SAP which complements the R/3 system in terms of supporting the direct communication between the buying and the selling company. Today this product is part of the mySAP.com initiative of SAP.
BW	Business Information Warehouse is a software product of SAP which complements the R/3 system in terms of a Data-Warehouse component.
CEO	Chief Executive Officer
CIP	Continuous Improvement Process is an initiative in Bosch to improve the business practices.
CIO	Chief Information Officer
CIS	Corporate Information Systems – Organizational Unit for RBUS to provide IT services on a corporate level.
CISC	Corporate Information Steering Committee
CIT	Corporate Information Technology; the name for the IT department
Computron Software, Inc.	Software Vendor, especially for financial applications
DOS/VSE	An old IBM operating system for mid-sized mainframe computers.
DTUS	Diesel Technology Corporation US, a joint venture with Detroit Diesel (http://www.dieseltch.com/), is a large heavy-duty diesel business.
E-commerce	Electronic Commerce supports the inter-organizational business by using communication technologies like the Internet.
EDI	Electronic Data Interchange represents the ability to interchange business documents like orders, calls or invoices between the business applications of the business partners.
ERP	Enterprise Resource Planning represents integrated information systems for companies, including modules for manufacturing, operations management, financials, human resources etc.
ETUS	A small software development business for engine management systems within RBUS.
EVA	Order Entry System in RB Germany
F/A	Fixed Assets is a part of an accounting systems which supports the management of fixed assets.
FI	Financial Accounting is a module of R/3.
G/L	General Ledger is the main part of an accounting system.
GB	Business Division; in German: Geschäftsbereich

GmbH	Gesellschaft mit beschränkter Haftung – a kind of a German constitution of a company comparable to LTD
HR	Human Resource is a kind of application system which supports the payroll, and other tasks of a personnel department like personnel planning.
IBM	International Business Machine Corporation is one of the biggest vendors of Information Technology.
IS	Information Systems
IT	Information Technology
J.D.Edwards	A vendor for ERP systems for mid-sized businesses, see http://www.jdedwards.com .
K1	ABS and Braking Systems Division of RB
K2	Lighting Technology Division of RB
K3	Engine Management for Gasoline Engines Division of RB
K4	Bodywork Electrical Systems Division of RB
K5	Diesel Fuel-Injection Technology Division of RB
K6	On-Board-Electronics Division of RB
K7	Mobile Communications Division of RB
K8	Semiconductors and Control Units Division of RB
K9	Starters and Alternators Division of RB
KH	Automotive Aftermarket Division of RB
mainframe	A computer category which are used as a host computer to provide services from a central data center.
MRP II	Manufacturing Resource Planning could be the vehicle for not only the production of materials and parts (MRP – Material Resource Planning), but also for manufacturing plans and schedules. MRP II follows a simple backward scheduling logic with explosion of the BOM (Bill of Materials) process. All of the lead time elements, shop routing, and process times are assumed to be deterministic. Linking other activities such as purchasing, inventory control and sales is performed in isolated planning and scheduling by simply retrieving, storing, and interchanging data in the system only when needed. While maintaining this simplicity of the system for the last two decades, no changes have been made in the basic calculation procedure in order to address changing requirements in manufacturing. The isolated integration of MRP II represents inadequate business solutions.
MVS	Multiple Virtual Systems – an IBM operating system for mainframe computers.
NAOC	North America Operations Committee is the top decision making body for the Bosch business in North America.
OEM	An Original Equipment Manufacturer is a manufacturer of products which are used in other products, e.g. the brake system made by Bosch which is used in a Ford car. The abbreviation is also used in the sense that the OEMs are the customers (e.g. car manufacturers) that are buying OEM products.
PeopleSoft	A software vendor of ERP systems (http://www.peoplesoft.com).
PRMS	Software solution offered by the interBiz division of Computer Associates International, Inc. (CA), in the application area supply-chain management. For details see: http://interBiz.ca.com/Solutions/supply_chain/Manufacturing/PRMS/default.htm
QI	Querschnittsbereich Informationsverarbeitung - Division for Information Technology of Robert Bosch GmbH. Since 1995 the European IT activities of the Bosch group have been managed by this cross-functional information processing department. QI supported the automation of processes and the engineering of business processes, as well as the provision of information in commercial and technical areas. The mission of QI was to increase the productivity and improve the competitiveness of the company.

R/3	SAP's R/3 System is an ERP-System for companies of all sizes and industries. It gives them both a forward-looking information management system and the means to optimize their business processes. R/3's core is a powerful program for accounting and controlling, production and materials management, quality management and plant maintenance, sales and distribution, human resources management, and project management.
RB	Robert Bosch GmbH - Bosch in 1999 is composed of approximately 250 subsidiaries and affiliated companies in 48 countries. The Bosch Group has 185 production plants worldwide, of which 142 are located outside Germany, in Europe, North and South America, Africa, Asia and Australia. Throughout the world, Bosch holds interests in 37 joint-venture companies. The number of employees is about 195,000 and the turnover in 1999 was about 54.6 billion DM. (\$25 billion)
RB/3W	The name of a project initiated in Bosch to define a software product for Bosch plants (W – stands for Werk) based on the SAP product R/3.
RBME	Robert Bosch Mexico
RBUS	Robert Bosch Corporation in USA
RG	Regionalgesellschaft – means the national company as a structural unit within the Bosch Group
SAP	SAP AG, Systems, Applications and Products in Data-Processing. SAP is the world's largest inter-enterprise software company and the world's fourth-largest independent software supplier, overall. In its most recent fiscal year, ending Dec. 31, 1999, SAP AG reported revenues of EUR 5.11 billion (\$4.56 billion). SAP employs over 21,700 people in more than 50 countries who are dedicated to providing high-level customer support and services.
SBPT	Skill Bosch Power Tools – The power tools division in the US.
UA	US Automotive Aftermarket Division of RB in USA.
UB	Business Sector (Unternehmensbereich)
UCUS	Subsidiary of RBUS in the communication business
UI	US Industry – the name of the Business Sector Capital Goods in the US
UO	US OEM – the name of the Business Sector Automotive Equipment in the US
UP	US Packaging Equipment is a part of the Business Sector Capital Goods
VP	Vice President
Y2K	Year-2000 – a special concern for the IT business with the change from 1999 to 2000, caused by the use of only two digits to store the information about the year in a date field in many computer software and hardware.

Appendix 1: Time line with Key Events/ Milestones

RB GmbH Organization:

- 1886 - Founding of Robert Bosch Corporation in Stuttgart, Germany
- 1964 - Creation of Robert Bosch Foundation, a non-profit organization, that is a majority (92%) shareholder of Robert Bosch Corporation
- 1968 - Business sector and product division organization structure (GB and K...)
- 1978 - First to bring Antilock braking systems (ABS) to market through the K1 division
- 1999 - Automotive Lighting Business (K2) operated as a joint venture with Magneti Marelli
- 1999 - Creation of BeQIK motto by Chairman of Robert Bosch GmbH

QI, the Corporate IT Division

- 1980 - IT division used SAP R/2 for accounting
- 1994 - Board of management of Robert Bosch GmbH gives two mission statements to the IT team. Creation of QI (Division of Information Technology)
- 1994 - The IT division creates QI days where IT people interact with potential end-users and vendors
- 1995 - Decision to implement SAP systems across the organization
- 1998 - More than 50 SAP systems implemented across Europe
- 1999 - Board of management told QI that the implementation of SAP R/3 was not acceptable since it did not meet business requirements. Wanted QI to provide the ability to close the books for all Bosch operations and report the results within 5 days.
- 1999 - QI started using a procedure model that has goals for each ERP project to make every process 30% faster, or with 30% fewer steps
- 1999 - QI calls for standardization that implies introducing the best processes for a certain procedure or the best system for a certain product

Robert Bosch US (RBUS)

- 1906 - First foreign subsidiary in New York
- 1993 - Don Chauncey, CIO of RBUS joins the company
- 1995 - Multiple information systems used in RBUS
- 1996 - RBUS buys braking division of Allied Signal and K1 division formed in USA
- 1997 - ETUS, a small software development business for engine management system formed
- 1995-1998 - Computron software used for operations at the corporate level to run G/L, F/A, and A/P (General Ledger, Fixed Assets, and Accounts Payable) and to replace the mainframe
- 1997 - Mike Bieganski, hired as CIO of K1 division
- 1997-1999 - SAP R/3 system implemented in K1 division
- 1997-1999 - UO division (K3 to K9 product lines) used 11 different systems to address their business needs
- 1998 - RBUS considers PeopleSoft for the human resource information system
- 1998 - Dr. Eggensperger wants a formal proposal to consider a system other than SAP R/3
- August 1999 - Don and the CFO of RBUS outline the direction to migrate to SAP to North American Operating Committee
- August 1999 - QI states that it is efficiency that is essential for QI not the total costs nor the number of employees
- August 1999 - NAOOC does not agree with the proposal and wants additional information regarding project cost drivers
- October 1999 - Don proposes running all systems (financial and logistics) centrally for RBUS
- October 1999 - Mike does not agree. He argues that agreement on a specific chart of accounts, on the cost component layout, and on customer and vendor numbering between RBUS IT division and QI need to be done first
- October 1999 - Kamran contends that SAP R/3 implementation should be run as a venture capital investment

Appendix 2: Selected Ten Year Financial Data for Robert Bosch Group Worldwide (see: Annual Report 1998, Robert Bosch GmbH)

in Mill. DM	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Net Sales	30,588	31,824	33,600	34,432	32,469	34,478	35,844	41,146	46,851	50,333
Net income	626	560	540	512	426	512	550	500	1,659	850
Total assets	22,205	23,544	24,247	24,452	25,447	27,373	28,504	32,273	34,906	36,343
Capital expenditure	2,064	2,790	2,273	2,038	1,552	1,578	2,056	2,419	2,905	3,773
Average number of associates in 1,000	175	180	181	177	165	156	158	172	180	188

Appendix 3: Excerpts from Statements by Dr. Scholl, Chairman of Robert Bosh GmbH in the Annual Report, 1999

Business results

Consolidated sales of the Bosch Group increased in 1999 by 8.4% to 54.6 billion DM. Foreign sales grew by approximately 11%. Foreign sales as a percentage of total sales increased from 65% to 66%. In our most important foreign markets, Western Europe (without Germany) and North America, sales increased 12% and 16% respectively. The growth of the Bosch Group was, as in the year before, primarily the result of the positive development in the Automotive Equipment Business Sector whose worldwide sales increased in 1999 by 12% to 35.5 billion DM. We thus participated in the unexpectedly robust automobile boom, primarily in Western Europe and North America. In addition, we again derived benefit from the large number of innovations in automobile technology, to which we made important contributions. As the year progressed, we initiated significant changes in the organizational structure of the Bosch Group. Some of the most important steps we took were the majority acquisition of the Japanese automotive equipment manufacturer Zexel Corporation, Tokyo, and the sale of our telecommunications product divisions for public networks, private networks, and terminals. This allowed us to concentrate our resources on important core activities. In the United States, Mexico and Canada we combined important activities in automotive equipment under one roof, i.e. our US subsidiary, Robert Bosch Corporation, Broadview (Chicago), Illinois. This enabled us to meet the requirements of our North American automobile industry customer better. On annual average, the number of employees increased in 1999 by 6,300 to about 194,300, or 3.4% more than in 1998. Although the profits of the Bosch Group in 1999 improved compared to the previous year, they still continued to be unsatisfactory in light of generally positive sales trends.

Increase efficiency

In order to meet the high standards set by our customers, emphasis throughout the company will be on more individual initiative, increased teamwork, and more pronounced customer orientation. These changes were incorporated in our new motto "BeQIK", in which Q stands for quality, I for innovation, and K for the German word for customer orientation. Under the motto BeQIK we had started two initiatives which fitted into our continuous improvement process CIP:

- With the "Time to Market" project, we will improve and speed up the internal processes in the product initiation phase. This will lead to a further shortening of development times, secure control over new start-ups, and generally better and faster fulfillment of customer wishes. This will also contribute to cost reduction.
- The "Customer Focus" initiative is designed to further increase Bosch customer satisfaction. Using close customer relations in all functional areas and at all management levels, we aim to fulfill customer needs and to increase customer benefits still more. The highest principle is reliable fulfillment of all agreed upon work and services. For our customers, working with us should be easy, quick and problem-free: we want to be "easy to work with".

Global purchasing program started

The worldwide purchasing volume of the Bosch Group, including services, merchandise and capital goods climbed in 1999 to 28.8 (1998: 26.7) billion DM, corresponding to 53% of our sales. About 57% (1998: 56%) of what we bought came from outside Germany. This purchasing volume meant that our suppliers had a significant influence on the global competitiveness of the Bosch Group. To strengthen our position, we had started a company-wide program which, in the next two years, will concentrate total purchases in all material areas on the most efficient suppliers.

Purchasing and logistics on the internet

We are using the internet increasingly in purchasing and logistics to integrate our suppliers in our processes and to reduce transaction costs. We introduced an E-commerce solution which allows departments to purchase expendable and standard materials directly via the internet. Smaller suppliers will also be able to network directly with our logistics systems.

New electronic marketing systems

The market structure in the after market is changing because of global trading groups and because of the increased use of new media tools such as the internet. Our sales organization has adapted to these challenges. By process simplification we have shortened order and delivery times. In addition, with our customers we have increased the use of electronic media in sales. We are adjusting the marketing structures for our entire product program to meet the requirements of E-commerce. As the use of electronic media increases, enhancement of our Bosch brands becomes even more important than in the past.

Appendix 4

Press Release by Corporate SAP AG on July 16, 1999

In a period of just over four years, the number of R/3 users in the Bosch Group has risen from almost none to 20,000. The 20,000th R/3 user to go live works at Bosch's automotive equipment/bodywork electrics division in Belgium. In the medium term, over 50,000 users at the world's largest independent automotive supplier could be using SAP's market-leading integrated solution to manage the company's business processes.

Bosch began using SAP R/3 at the start of 1995, in its telecommunications division (Bosch Telecom) in Frankfurt. Today, Bosch employees all over the world work with R/3 every day in all business units - including automotive equipment, power tools, household appliances, thermotechnology, automation technology and packaging machines, thus emphasizing Bosch's decision to make R/3 its software of choice for mapping and supporting its business processes.

So far, Bosch has been using SAP R/3 in the areas of Accounting, Logistics and Human Resources, deploying practically all of the classic R/3 modules. Around the world, Windows NT is used as a server operating system in several "server farms" (about 150 servers in total). Bosch currently has over 40 R/3 Systems. IT projects instituted more recently are based on products in SAP's New Dimension initiative, namely the SAP Advanced Planner and Optimizer (SAP APO), SAP Business Information Warehouse (SAP BW) and SAP Business-to-Business Procurement (SAP BBP) in conjunction with R/3.

Within its cross-functional information processing department (QI), Bosch has a dedicated internal team of consultants who deal specifically with R/3 implementation and use. The pool's members combine specialist knowledge of R/3 with general business know-how. They cover not only all relevant SAP topic areas, but also ensure that standardized master data, basic structures and templates are used. Besides carrying out project work and safeguarding Bosch's process knowledge, the team employees ensure a continuous know-how transfer between projects, locations, and business areas and between Bosch and SAP.

Appendix 5: Selected Ten Year Financial Data for RBUS (Data extracted from Annual Report)

in Mill.\$	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Net Sales	1,114.4	1,173.2	1,206.8	1,391.5	1,493.7	1,773.8	2,016.1	3,010.7	3,419.4	3,611.2
Income from operations	27.8	9.2	-17.8	10.7	43.2	89.2	99.0	87.7	69.6	82.3
Total assets	818.0	899.8	848.0	810.2	928.6	1,114.8	1,173.1	2,391.9	2,434.7	2,701.1
Capital expenditure	107.9	89.9	61.4	53.6	76.3	89.3	118.1	171.0	206.2	280.6
Average number of associates	4,901	5,198	5,244	5,134	4,694	4,965	5,970	9,596	11,041	12,394

Appendix 6: Plan Proposed by Don

Summary:

Outlined below is the introduction of SAP R/3 Financials, Human Resources/Payroll, and Logistics modules for North American business units.

Current Situation:

Financials: Computron Software is used for General Ledger, Fixed Assets, Accounts Payable and Workflow on an AS/400 computer. Additionally, Geac software is being used to run the Accounts Receivable system for several divisions on an outsourced mainframe. There are numerous interfaces that are being maintained between these systems on diverse platforms.

Human Resources/Payroll: Multiple Human Resource software packages and databases are currently in use across divisions and locations. The pension and benefit programs are outsourced to Towers Perrin and the payroll is being processed on an antiquated legacy mainframe system. The systems are non-integrated solutions that are inefficient due to fragmentation, duplication, and division level customization. The current architecture is not suitable to meet future Bosch business requirements.

Logistics: The logistics systems architecture consists of several systems loosely integrated through in-house developed software and complex interfaces. The support of this inefficient architecture is expensive and does not allow for quick response to changing customer requirements.

Objective: The following systems would be implemented in North America:

Financials: Implement the Bosch standard SAP R/3 Financial system in all RBUS divisions to provide a common solution for financial consolidations and for internal and external reporting.

Human Resources/Payroll: Implement the Bosch standard SAP R/3 Human Resources/Payroll system to establish a consolidated and centralized HR and Payroll system for US Bosch locations.

Logistics: Implement SAP Logistics at the UO plants.

Project Cost:

The costs for Financials and Human Resources/Payroll projects were based upon consultation with QI consultants and three external implementation partners and will be fine-tuned in the initial project phase. Logistics costs were high level estimates to provide a total SAP cost picture – the logistics costs would again be reviewed with the NAOC prior to implementation.

Justification:

Financials: The existing RBUS Financial system must be replaced:

- The current software, provided by Computron Software, will not be supported on the AS/400 computer after December 2001.
- IBM has announced that the support for AS/400 operating system required by Computron software will end in May 2000.
- Benefits to be realized:
 - Standardize on the RB chart of accounts across North America business units (except SBPT).
 - Provide building block for subsequent SAP logistics implementation at the plants.
 - Simplify financial consolidations for RBUS and divisions.

Human Resources/Payroll: SAP HR/Payroll implementation is required to:

- Eliminate aging mainframe legacy system.
- Provide Human Resources systems where none exist today.
- Standardize HR functions across divisions.
- Support RB worldwide standardization through SAP R/3

Benefits to be realized:

- Reduce dependency on suppliers May&Speh, Geac and Computron.
- Possible elimination of outsourced benefit provider, Towers Perrin.
- Elimination of 3rd Party Software Solutions HRPulse, Access Databases, spreadsheets and support
- SAP ESS (Employee Self Service) reduction of employee transaction costs.

Logistics: SAP implementation is necessary to:

- Provide for RB standardization in UO plant operations including DTUS and RBME.
- With SAP Financial and Human Resources/Payroll, provide integrated, closed-loop system.
- Eliminate non-integrated PRMS solution, where:
 - Addition and deletion of new businesses is complex and difficult.
 - Existence of numerous interfaces creates a complex environment.
 - In-house developed systems are costly to maintain and support.
- Remove the requirement to upgrade PRMS from version 8.4 to 9.0.

Timeframe:

Financials: The total project duration is estimated to be 3.5 years from start up, with the first division to go live in 12 months. The remaining divisions are to follow over a period of 30 months.

Human Resources/Payroll: Implementation of Human Resources/Payroll will start concurrently with Financials. The total project duration is estimated to be 15 months, with the first pilot site to go live in 12 months and remaining sites to be implemented in 13 to 15 months.

Logistics: The project is roughly estimated to be 3.5 years in duration.

Risk analysis:

Project risk is mitigated due to:

- Use of experienced U.S. implementation partners with proven implementation successes.
- Use of QI and K1 resources and experience.
- Formal coordination meetings between the Financial, Human Resource/Payroll and Logistics project managers.
- Staged implementation using an initial pilot implementation to prove concept.
- Standard SAP software will be used without modification.
- Readiness to change Bosch processes and adopt SAP standards.
- Freeze development in current HR/Payroll and Financials system.

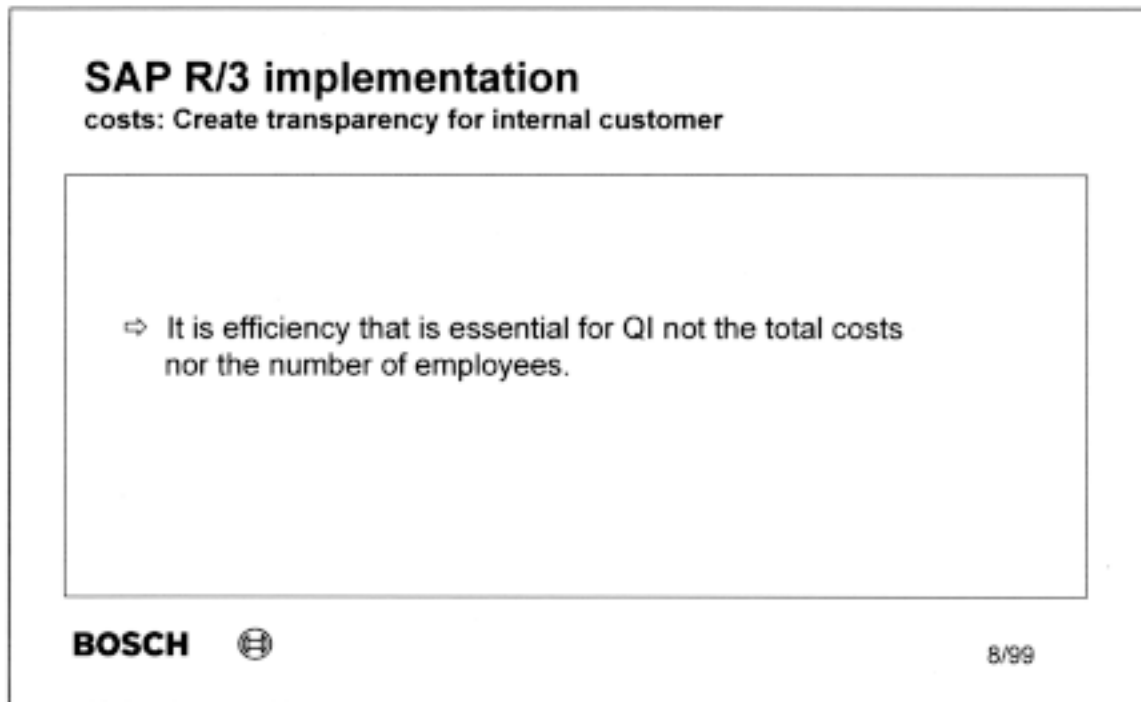
Possible increased project risk would include:

- Merger and acquisition activity during project life cycle.
- Logistics activity proceeding prior to QI kernel availability.
- Personnel turnover during project implementation due to SAP salary inflation.

Next Steps:

- Select Implementation Partner
- Staff project core teams.
- Project start-up.

Appendix 7: Directive from QI to RBUS



¹ <http://interbiz.ca.com/Products/SC/ERP/default.asp>

This web site provides further information about the products.

² <http://www.lawson.com> Further information about the software is available from this web site.

³ Austin, R.D. and R.L. Nolan: Manage ERP Initiatives as New Ventures, Not IT Projects. Working Paper. Harvard Business School, 99-024.

⁴ They use an EDI system from future3-software, see: <http://www.future3.com> for further details about the software.

Many of the photographs that have been used in this case study are from Robert Bosch Corporation, Photo: Bosch.

Instructor's Manual

Multiple Information Systems Coping with a Growing and Changing Business: Robert Bosch Corporation

Case Overview

In this case study, we present the strategic issues facing the CIO's of the information technology division of the corporation, Robert Bosch GmbH, and its US subsidiary, Robert Bosch USA. The corporation has traditionally followed an international/multidomestic strategy and used multiple information systems at its plants/divisions/business sectors. Due to higher pressures to cut costs, increase interchangeability of products among the many plants worldwide, and fulfill customer requirements, the corporation was moving to a global strategy.

Dr. Eggenesperger, CIO of the corporate IT division of Robert Bosch (QI) acknowledged that there were some challenges in implementing SAP R/3 worldwide. QI had standardized on use of SAP R/3 during 1995 and it had ended up with many locations in Europe implementing SAP R/3 systems non-uniformly. In order to rectify this, QI focused on standardizing the IT-systems for use in every plant location using a top-down approach. During 1999, the Board of Management of Robert Bosch GmbH stated that the current implementation of information systems was not acceptable and did not meet corporate requirements. In order to fulfill the requests of the Board, the CIO of QI considered the following strategies for implementation options: standardize the ERP approach within the entire Bosch group, implement a domestic ERP approach for each country, or implement product-division based ERP approaches within the global operation. In addition to the requirement for a corporate strategy, there were requests to modify the IT infrastructure in several domestic markets.

Don Chauncey, the CIO of the US Operations (RBUS) had to decide whether to continue with the current variety of information systems or to shift to a uniform SAP R/3 system for all the divisions of RBUS. In order to meet the current

business needs, many different information systems developed by multiple vendors were implemented throughout RBUS. Some of these systems were not functioning well and there was pressure on Don to make changes. For example, the software supplier of the financial system announced that they will support the current AS/400 system only until the end of 2001. The Human Resources (HR) department recommended that PeopleSoft will be their choice to address the payroll/human resource needs. Changes were also required in the logistics area at the plant level.

During August 1999, Don proposed implementing SAP R/3 in the Financials (FI), Human Relations/Payroll (HR), and Logistics at the plants in North America. This proposal was put on hold by the executives who headed the North American Operations Committee (NAOC). They asked for additional information on the project cost drivers. Don, as the CIO of the domestic level organization, was faced with the decision to either stay with the multiple information systems or champion implementing SAP R/3 throughout RBUS. He was unsure which of these information technology (IT) solutions would be most effective in coping with the growing and changing business of RBUS.

Case Objectives

The objectives of this case study are:

- (a) To show the students importance of the alignment of business strategy and the IT strategy in a company at both corporate level and country level.
- (b) To identify the issues faced by RBUS in moving to a standardized corporate-wide information system such as SAP R/3.
- (c) To teach how a ERP system can be implemented in many ways with resulting benefits and prob-

lems .

- (d) To show the students that if an ERP package is not implemented correctly, it might lead to many different ERP systems existing within an organization that do not communicate with each other.

Courses and Levels

The case study could be used in courses that deal with international business, Management Information Systems (MIS), and ERP concepts. This case study has been field tested in three undergraduate MIS, one MBA class, and one graduate MIS class. In addition, it was tested in a workshop with 12 international faculty members from different Business Schools, 14 faculty members during SAP 2001 Research and Curriculum Congress and in a round-table discussion with 5 faculty members. The case study could be used in:

- (a) Undergraduate and graduate courses on business strategies and international business: The instructor can use the material presented to analyze and identify the current and future business strategies of RB GmbH and how it compares with the strategies of RBUS. In addition, he/she can discuss the alignment between information systems and business strategies.
- (b) Undergraduate and graduate MIS courses: The instructor can use this case study to evaluate different options to improve the information systems infrastructure from a domestic point of view for RBUS and from a corporate point of view for the total Bosch group.
- (c) Courses for business executives who are in charge of making decisions on implementing ERP initiatives: The instructor could use the case to teach the limitations of ERP initiatives in making the changes in organization and the need for top management un-

derstanding, support, and funding to make the change a reality.

- (d) Courses for faculty members who teach ERP courses: The educators who are responsible for teaching ERP courses (some of them attended the faculty workshop) and the team leaders who attend the annual conference hosted by SAP might benefit from this case study. They could understand the details of how to design, build, and implement SAP R/3 systems. This study provides them a general understanding of the power and limitations of ERP systems and an example of issues faced by an organization in implementing the system.

Research Basis

This case study was created by the authors visiting Robert Bosch GmbH in Germany and Robert Bosch US at USA. They interviewed the executives at both locations for a number of days. In addition, the authors visited the headquarters of the braking division (K1) and interviewed Mike Bieganski, CIO of K1. They interviewed Krish Kumar, CIO of the OEM-division US (UO) using video conferencing technology. The interviews were transcribed and the excerpts were used in the case study. In addition, one of the authors worked at Robert Bosch GmbH during his sabbatical and gathered detailed information. The company reviewed the case study and edited it thoroughly before giving permission to release the case study for uses in classrooms.

Suggested References

- Connection to the theory of implementing ERP systems:
 - *Thomas H. Davenport: Putting the Enterprise into the Enterprise System. In: HBR July-August 1998, pp.121-131.*
 - *Thomas H. Davenport: Mission Critical. Realizing the Promise of Enterprise Systems. Boston 2000.*
- Connection to the theory of classifying organizations as global, international, transnational, and multi-domestic organizations.

- *Charles W.L. Hill, International Business: Competing in the Global Marketplace, Irwin McGraw-Hill, 2000.*
- Connection to the theory on aligning business strategies with IT architectures.
 - *K. C. Laudon, and J.P. Laudon, Management Information Systems. Organization and Technology in the Networked Enterprise. 6th edition, Prentice Hall 2000.*
 - *Marilyn Parker, Business-Technology Alignment Model, Prentice-Hall, 1996.*
- A basic understanding of the architecture of the R/3-System is provided by the following books:
 - *Thomas A. Curran, Andrew Ladd, SAP R/3 Business Blueprint : Understanding Enterprise Supply Chain Management, 2nd ed., Prentice Hall Inc., 2000. (Overview to R/3 and an process oriented implementation methodology are presented.)*
 - *Ruediger Buck-Emden, The SAP R/3 System. An Introduction to ERP and Business Software Technology. Addison Wesley Publishing Co., 2000. (This book provides a more technical background of the R/3 architecture and the system.)*
 - *Nancy H. Bancroft, Henning Seip and Andrea Sprengel, Implementing SAP R/3: How to introduce a large system into a large organization. 2nd edition Manning Publications Co., 1997. (Overview of SAP and R/3, the SAP R/3 system in depth, Step-by-step process for implementing R/3 based on real-life examples.)*

Instruction Plan

This case study works well when students are divided into teams and assume the following roles.

Team 1 (CIO of RBUS): Defend the plan to continue with the current implementation of multiple information systems. What might be the benefits and disadvantages of this decision.

Team 2 (CIO of RBUS): Defend the plan to be a champion of implementing SAP R/3 system throughout RBUS. What steps need to be taken to make the operating committee accept the next proposal.

Team 3 (CIO of Robert Bosch Corporate IT Division): Defend the implementation of a standardized ERP approach for the total Bosch group. Discuss the advantages and disadvantages.

Team 4 (CIO of Robert Bosch Corporate IT Division): Defend the implementation of domestic ERP approach for each country. Discuss the advantages and disadvantages.

Team 5 (CIO of Robert Bosch Corporate IT Division): Defend the implementation of business-unit based ERP approach within the global operations. Discuss the advantages and disadvantages.

Answers to Discussion Questions

Please contact the authors for possible answers to discussion questions and sample student responses. You can also contact them to obtain desk copies of a textbook with CD-ROM that includes this case study.

Computer Support and Audio-Visual Support

Internet could be used to find out further information about:

- (a) The products, technologies used, and processes adapted by Robert Bosch GmbH: www.bosch.com
- (a) Information on PRMS system: <http://interbiz.ca.com/Products/SC/ERP/default.asp>
- (b) Information on SAP R/3 system: www.sap.com

Additional Discussion Questions

- (a) Should the top management of Robert Bosch GmbH take a more active interest in the evolution of the IT strategies?
- (b) Are there any cultural issues that you find different between the German and US management?
- (c) The emphasis from top management seems to be to implement ERP so as to obtain corporate financial statements within five days. Should more emphasis be placed on creating ERP systems that support logistics, manufacturing, or product design and development - the core competencies of a technology-driven company?

Proposed Session Plan

Session 1: **Distribute case study. Provide short introduction to the case study. Divide the class into five teams and make team assignments.**

Session 2:

(0-20 minutes)	Presentation by Team 1. Questions and answers.
(20-40 minutes)	Presentation by Team 2. Questions and answers.
(40-60 minutes)	Presentation by Team 3. Questions and answers.
(60-80 minutes)	Presentation by Team 4. Questions and answers.
(80-90 minutes)	Presentation by Team 5. Questions and answers. Possible discussion questions by instructor.

Session 3:

(0-20 minutes)	Feedback on group presentations
(20-40 minutes)	Summary: "What we have learned?"
(40-60 minutes)	Prologue. What happened in the company?

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