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ABSTRACT

With globalization, outsourcing, changing regulations and rapid technological innovations, companies are forced to embrace more agile business architecture. This in turn calls for enterprise applications that are based on open standards, simple to implement, and easy to modify and upgrade. In response to these structural changes in the market and customer demands, and facing fierce competition in a saturated market, SAP had to rethink its strategic position. This case discusses how SAP transformed itself by turning its proprietary software products to an open development and integration platform so that customers could modify them to suit their specific needs. The implications of this new strategy for software industry as a whole are discussed.

Keywords: strategic fit, SAP, software industry

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OPENING UP OF THE SOFTWARE INDUSTRY: THE CASE OF SAP

I. INTRODUCTION

Companies in the 2000s were increasingly challenged to devise and implement new business models in order to adapt to the changing economic landscape. This entailed putting in place enterprise applications that were open-source, simple to implement and easy to integrate within and without the organizational bounds. Because traditional enterprise resource planning (ERP) systems were generally complex, proprietary and difficult to install, ERP systems providers had to reposition themselves strategically. SAP, the leading company in this space, faced this challenge by transforming itself from a closed source software developer to an open source software integrator. By opening up its proprietary software products as an open development and integration platform, SAP would allow its customers to modify their ERPs to suit their specific needs. This new strategy, however, would fundamentally affect the company's business architecture. In other words, SAP had to rethink the totality of how it would define its value proposition, identify and target its customers, deploy its resources, configure its business processes, manage its alliances, and develop and maintain its profit and growth engines.

II. BRIEF HISTORY OF SAP

SAP was founded in 1972 by several former IBM software engineers. Led by Hasso Plattner, the company started its business in Walldorf, a small town outside Frankfurt, Germany. SAP was the vanguard of developing application systems which aimed to automate the entire enterprise operations rather than focusing on individual business functions. Such application packages were later referred to as enterprise resource planning (ERP) systems in the software market. Many large businesses were changed by this new breed of software that seamlessly integrated all the vital information flowing through companies.

In 1973, SAP launched its first major product, R/1, an instantaneous accounting transactions processing system. Six years later, SAP successfully developed R/2, the successor to R/1. The mainframe software package was able to link external databases and communications systems. In the late 1980s, SAP went public. Around the same time, Plattner began to create the next version of the software package that would be able to work in the decentralized computing environment. In 1992, as sales of its R/2 mainframe software began to slow down, SAP introduced R/3, the client/server–based ERP system. In 1998, SAP was listed on the New York Stock Exchange (NYSE). In the same year, Henning Kagermann, a former academic in theoretical physics and a veteran executive of the software company, was named co-chairman along with Plattner. This also marked the pinnacle of the German software company in the 1990s, as it was considered by many as a second Microsoft [Lower 2006].

III. THE REVOLUTION IN THE BACK-OFFICE

Before ERP, companies spent a fortune on tailor-made application systems to support their back-office functions such as distribution, accounting, human resources (HR) and manufacturing. Companies spent millions of dollars to integrate their systems, e.g., building highly customized interfaces between application systems and their individual databases, and frequent patching and data cleanup to ensure data integrity and consistency. It was ERP that came to change how large companies' businesses operated in the 1990s.

ERP was a successor to materials requirement planning (MRP) systems, which were designed to automate and manage production scheduling, including ordering the appropriate materials. In the 1980s, with the introduction of ERPs, separate MRP systems were no longer required, as their main features and functions were incorporated in this new breed of enterprise application. ERP could support a broad range of activities in businesses, including product planning, parts

purchasing, maintaining inventories, interacting with suppliers, providing customer service and tracking orders. ERP could also include application modules for the finance and HR aspects of a business.

Building a single software program that served the multiple needs of various departments was a tremendous challenge, as each department often had its own IT system designed specifically to address its needs. ERP did just that—it combined all the diverse needs of an enterprise's departments together into a single, integrated software program that operated on a single database. Thus, the various departments could share information and communicate with each other more easily. Such an integrated approach could yield a tremendous payback if the software was correctly installed.

In the pre-ERP era, after a customer issued an order, the details of an order were often entered and re-entered into different departmental IT systems. As there were multiple data entry and re-entry steps required to capture an order's details into different IT systems, errors were often rife. Meanwhile, it was difficult to truly know what the status of the order was at any given point in time. For instance, the finance department could not get into the warehouse's IT systems to see whether the item had been shipped or not.

With ERP, there was no longer a need for stand-alone systems in finance, HR, manufacturing and warehousing. Now a single unified application made up of various modules could replace all the old stand-alone systems. The modules were tightly integrated and finance could now look into the warehouse to check if an order had been shipped.

Many companies would need months, or even years, to implement the entire ERP package with a process that often involved five to six times the original cost of the software. These often included the costs of hiring external consultants to conduct large scale reengineering in a number of business processes and organization structures, and to facilitate the implementation of such changes within an enterprise.

IV. IMPACT OF ERP ON ENTERPRISES

BASF Aktiengesellschaft was one of the successful SAP implementation stories. As a German-based chemical company and a long-time customer of SAP since the 1980s, the company had more than 82,000 employees worldwide and sales of US$45 billion in 2004. The chemical company leveraged SAP to form a core platform to link up various functions of the company, from finance to procurement, and from production to warehousing and inventory. After more than two decades, with substantial savings and added values, BASF continued to invest in SAP to standardize the processes of all divisions within the enterprise [Sullivan 2005].

Although an ERP system was designed to be an off-the-shelf package, companies often found the system overly complex to install and run. In particular, ERPs often changed how people worked and how businesses were run. For instance, Dell Computer attempted to implement the SAP R/3 system to support its manufacturing operations in 1994, and had to abandon the project in 1996. Terry Kelley, Chief Information Officer at Dell, commented: "SAP was too monolithic to be altered for changing business needs … Over the two years we were working with SAP, our business model changed from a worldwide focus to a segmented regional focus" [Stein 1998].

There were many other leading corporations besides Dell that also took on SAP projects and quit in the middle of their implementation phase. Some were able to exit without much financial setback. Others were not so lucky. For instance, Kmart attempted to implement a SAP system in the 1990s, but it had to write off the US$130 million project that never got off the ground [Worthen 2002].

In addition to the overall impact on a company's business model, overlooking its process and people aspects in implementing a SAP project could also be devastating. In 1997, Nestle USA, the US$8.1 billion subsidiary of the Swiss consumer goods giant, embarked on a project to install

SAP's ERP system to centralize several of its divisions. The company rushed to install the software to meet the Y2K deadline, ignoring those that were affected by the new processes as well as the organizational structures embedded in the SAP system. Subsequently, users rebelled, morale sank and employee turnover increased. In June 2000, Nestle USA halted the project and restarted from scratch. By the time it was completed in 2003, the total time the project took was six years and the cost had escalated to US$210 million. Nestle USA claimed, however, that the project was worth the effort, as it saved the company US$325 million.

Based on their implementation experiences, a number of consultants suggested that the only way to reap full benefits of the software was to submit to SAP by making minimal changes on the software. Nonetheless, Thomas Davenport, a professor at Boston University, warned that companies might lose their distinct characters and competitive advantages by molding themselves into the models defined by SAP [The Economist, 1998]. To address such issues, some companies adopted a hybrid strategy by customizing the ERP software at the code level. However, such an approach often posed a high risk of maintaining and upgrading the modifications, particularly while incorporating the changes with new releases of the software packages.

Instead of taking an ERP package in its entirety, some companies adopted a best-of-breed approach, in which separate software packages (modules from major ERP vendors or products from niche software makers) were selected for each process or function and then pieced together using custom-built interfaces. According to a survey conducted by Harvard Business School (HBS), 60 percent of the respondents indicated their companies had adopted this particular approach. A successful case in point was Dell Computer [Stein, 1998]. In 1997, a year after abandoning the SAP project, Dell assembled its own ERP system by selecting specific functionalities from a wide range of packages, including i2 Technologies (for materials management), Oracle (for order management), and Glovia (for manufacturing such as inventory control and warehouse management).

V. DOWNFALL OF THE ERP MARKET

By 1999, the ERP market was losing its glamour. SAP's major competitors, like PeopleSoft, were in disarray. SAP's share price plummeted for the first time since its initial public offering in the U.S. in 1998. This was partly owing to the high failure rate (over 50 percent) in ERP implementations, according to a survey conducted by HBS. Although the definition of failure was arguable, it mainly referred to the user acceptance of process and organization changes, projects going over budget, time delays, lack of appropriate skills, and technical failure.

Besides the negative implementation experiences, customers found that most ERP vendors (and their products) were misaligned with the new technical and business requirements under the networked environment based on the Internet. In terms of the technical requirements, SAP was slow to make its software Web enabled. The company was confident that its R/3 product could cope with any form of distributed computing introduced by the Internet and hence it (and many other ERP vendors) was reluctant to adapt the Web-based computing architecture. Moreover, as the original design of ERP systems was aimed to improve only the internal operations of an enterprise, typical ERP software lacked the capabilities to link up companies, suppliers and customers operating in an interconnected environment. In terms of the business requirements, the changing model of the business of enterprise applications software was challenged by an alternative offered by Web computing. Traditionally, ERP vendors assumed that a small proportion of the workforce (around 10 percent of the workforce in a large global company) would access the application. Hence, the license fees were often set at a high level. With the arrival of the Internet and Web computing, however, a different approach was made possible. Applications could reside on servers and be accessible to anyone through a browser running on any Web-enabled device. In light of this change, a volume pricing model was now preferable to the high license fee model.

For these reasons, traditional ERP players were inadequate to help companies become e-businesses. Customers were forced to source various components from a number of software players, integrate the disparate software products and form links to the ERP systems. These component software makers included Ariba and Commerce One for procurement; IBM for e-commerce platform; and Siebel and Onyx for sales and front-office functions. As some industry analysts described, this was almost like having a second "backbone" on top of the current ERP system and IT infrastructure. This so-called enterprise application integration (EAI) took up half of the time and resources of many corporate IT departments [The Economist 1999].

SAP decided to catch up with all the changes in the e-business era. In late 1999, SAP launched a Web-based version of its flagship product, called mySAP.com. It aimed to become a full-fledged, business-to-business portal that would support online transactions and other services arising in the networked economy. To strengthen its e-business capabilities, SAP invested in Commerce One through its US subsidiary, SAP Markets, to obtain a minority stake of the e-procurement software company. In 2001, SAP acquired enterprise portal software provider Top Tier Software, and renamed it SAP Portals. Meanwhile, SAP raised its Commerce One ownership stake to around 20 percent.

In the early 2000s, the IT industry experienced the worst economic downturn in history triggered by the burst of the dotcom bubble. Although its revenues grew remarkably from 1997 to 2000, SAP began to suffer from a lack of revenue gain and a decrease in net income in 2001 and 2002 [see Figure 1 and 2]. Facing these industry-wide difficulties, SAP improved its products by integrating key offerings from its subsidiaries, SAP Portals and SAP Markets, into its mySAP product. As a number of newly founded software companies collapsed during the economic downturn, customers once again turned to established software vendors that offered integrated and sustainable products. These new requirements certainly played to SAP's traditional strengths.

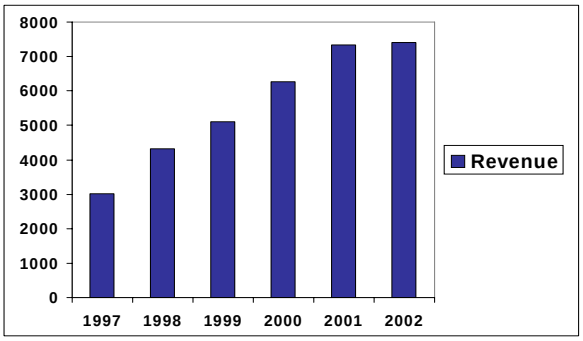

Figure 1. SAP's Revenue between 1997-2002 (Euro million)

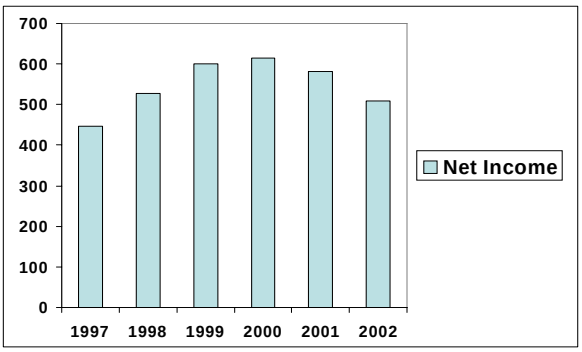

Figure 2. SAP's Net Income between 1997-2002 (Euro million)

VI. INDUSTRY DYNAMICS AFTER THE DOTCOM CRASH

After three years of declining technology sales [see Figure 3], the global IT industry returned to growth in 2003 and the outlook seemed positive. According to a study conducted by McKinsey & Co. in 2004 on IT spending trends, chief information officers (CIOs) from the Fortune 500 companies said they would increase their IT budgets. Nonetheless, they would spend money quite differently. CIOs expected to get more out of their technology investments. Companies were more concerned about the value of IT and enforced stringent rules and guidelines for IT spending. For instance, procurement departments became more involved in the IT purchasing process. Many were applying formal bidding mechanisms that required vendors to go through a competitive process in getting the complex deals. In addition, CEOs became more demanding in the return on investment (ROI) on new technology spending. As such, CIOs were now required to develop stronger business cases to support their investments, and to tie the overall performance of IT to their personal performance measures. Subsequently, the growth of overall IT spending was expected to be more modest from 2003 onward (around 4 to 6 percent). This was far below the double-digit figures of the heydays in the 1990s [Davis et al. 2004; Red Herring 2005; Nystedt 2005; Bartels 2004].

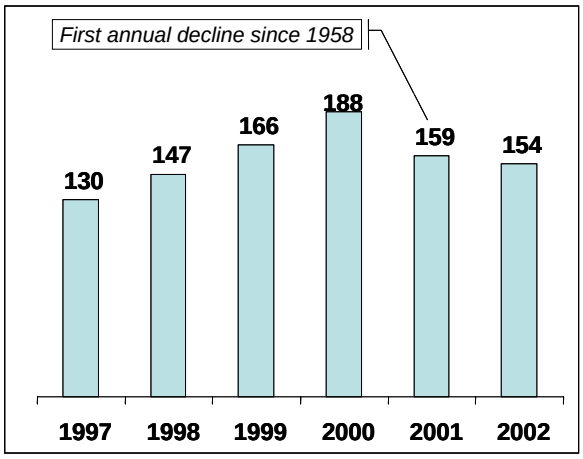

Figure 3. Aggregate Capital Expenditure of U.S. Companies on IT (US$ billion), adopted from [Davis et al. 2004].

The IT industry was also considered to be in the middle of an eight-year period of “technology digestion,” explained following. Hence, senior managers were reluctant to make any major technology investment. According to Forrester Research, investment in IT had continued to increase in the 60 years since 1956. In the U.S., the ratio of IT investment to gross domestic product (GDP) increased from 1 percent in the mid-20th century to more than 4 percent at the beginning of the 21st century. However, such growth was not always constant. In fact, it was characterized by periods (eight to ten years) of fast growth followed by equally long periods of slow or negative growth. Based on previous historical data, three growth periods were identified in the IT industry corresponding to the introduction of new technologies [see Figure 3]. The first period saw the introduction of mainframe computing between the mid-1950s and mid-1960s. The second period introduced personal computing from the mid-1970s to the mid-1980s. The third period introduced network computing between the early 1990s and the early 2000s. In these periods, companies invested in new technologies often on faith and without strong links to ROI measurements. Consequently, companies went many years before fully exploiting the technologies. During these “technology digestion” periods, companies often focused on changing the relevant business processes and the corresponding organizational structures to lower spending on new technologies. These spending lags were also noted by researchers from MIT’s Centre for E-Business. Based on large-scale statistical results, they cited that companies often implemented new technologies years before they could get value from them. This was particularly true in terms of infrastructural investments [Brynjolfsson and Hitt 1998].

NEW TREANDS AND STRUCTURAL CHANGES IN THE SOFTWARE INDUSTRY

Software spending was expected to recover and reach US$325 billion by 2008. The growth rate of the market was expected to be between 3 and 7 percent annually. In general, the software market was categorized into the following two groups: system software (a layer of software that operated between IT hardware and application software and accessed only by IT staff such as system administrators) and application software (operated by business users in their respective functions or processes) [Davis et al. 2004; Bartels 2004; Kerstetter and Hamm 2005; The Economist 2005].

In the short term, software spending would be driven by systems software (e.g., systems management, storage, database and security). Systems management software would mainly be purchased to monitor and manage distributed computing resources such as PCs. The purchase of storage and database software was driven by the increasing demand for data storage capacity owing to Sarbanes-Oxley compliance and increasing needs of customer data. Lastly, security applications would aim to mitigate risks such as data leakage in the networked environment [The Economist 2005].

With regard to the spending on application software, companies were expected to look for specific point solutions (e.g., business intelligence, portals, enterprise content management and collaboration) to enhance the effectiveness of their business processes. Consequently, the sale of traditional enterprise application packages (e.g., customer relationship management (CRM), enterprise resource planning (ERP) and supply chain management (SCM) systems developed by players such as SAP and Oracle) was expected to be slow. This slowing down would be a result of the massive organizational impact that the implementation of these enterprise software packages had in the 1990s and early 2000s. Moreover, CRM, ERP and SCM applications were challenged by increasingly complex integration issues. Historically, these enterprise applications were stitched together via some loose interfaces. As many of these enterprise software packages were developed by using proprietary codes, they became highly incompatible with each other if developed by different vendors. Companies were therefore not able to leverage these application packages as a holistic solution for their enterprises.

As a result, purchases in relation to the integration of the various enterprise applications were expected to rise. In particular, as the concept of service-oriented architecture (SOA)—an approach that emphasized code reuse and business modeling—would take hold in enterprise computing in the long term, associated technologies such as Web services would become the main drivers of software spending. As Web services would form an open-system platform, it would enable the diverse application software systems to be melded into a holistic solution. This new trend would then allow enterprise software vendors to adopt a more integrated approach and would give them an extended scope of offerings. In turn, these vendors were expected to transform themselves from mere product vendors to comprehensive solution providers [Heng 2005].

Besides building software that would be easily integrated with other vendors' products, industry players were expected to introduce software as a service, particularly for the small and medium-sized businesses. Under this new arrangement, end users would not have to deal with the complexities and costs of on-site implementation of the enterprise software packages. All the technologies would be run off-site by the vendors and the end user would only need to pay as they used. As users would no longer own the software, software companies would be impacted by the reduction in sales of their software licenses.

Service-Oriented Architecture and Web Services

Customers constantly looked for ways to modify and upgrade their enterprise applications to complement their changing business needs. To address this issue, the SOA concept began to take hold as a conceptual framework to develop and integrate applications. The concept was an evolution of distributed computing based on the loosely coupled design paradigm. With this architecture (i.e., its specification), developers could package business logics and functions as

Web services consumable across different environments. All Web services could then be connected with each other through the Internet (the common communication backbone). Developers could then build applications by coupling one or more of these services without knowing the underlying implementation details of the services.

Computing environments were increasingly heterogeneous across diverse operating systems, applications and infrastructure. In addition, many applications were tightly integrated with business processes. Hence, it would be nearly impossible for an enterprise to build a new homogenous infrastructure from scratch. By leveraging SOA and Web services, companies could develop new applications (without concerning the selected platforms as long as they met the pre-defined SOA and Web services specifications) to address new business requirements, and could thereby continue to leverage their current investments in applications and infrastructure. In this way, companies could develop and modify their application systems within a much shorter timeframe. Moreover, a number of Web services modules were expected to be pre-packaged so that companies could purchase them off the shelf to reduce their internal coding efforts. Major IT players including Microsoft, IBM, SAP and Oracle had already jumped onto the SOA and Web services bandwagon.

Although SOA and Web services were taking hold rapidly, there was no universal starting point for implementing the architecture and technology. Hence, companies would need to carefully consider their initial needs as well as future potentials, in order to determine the appropriate SOA and Web services platforms to avoid a lock-in.

Pay-As-You-Go Application Services

Because of the over-purchase of IT during the dotcom boom, companies now wanted to access the latest software packages without large up-front capital investments. In addition, small and mid-size businesses often wanted to acquire world-class application packages without the high investments in hardware, software and supporting staff. In view of these new customer requirements, a number of industry players were expected to introduce a new pay-as-you-use model by delivering software as services. This approach was based on the concept of utility computing, which was defined as the provision of services wherein a service provider made computing resources (e.g., applications) and infrastructure management available to the customers on need basis. This service provisioning approach was analogous to other utility services (e.g., electrical power, water) that aimed to meet the fluctuating needs of customers, and charged for the resources based on usage.

Software-based services were first introduced in the dotcom boom through the application services providers (ASPs). These providers managed and distributed application services to customers across a wide area network from a central data centre. In essence, ASPs were a way for companies to outsource some or all aspects of their application needs. However, the ASP model was not fully exploited. In 2002, with the introduction of utility computing, software companies re-explored the potential of this service provisioning model. Pay-as-you-go computing services could be broadly categorized as “hosted” and “on-demand” services. Hosted services indicated an arrangement wherein customers outsourced their hardware but purchased licenses from the software vendors. Customers would pay for the usage of their hardware on a need basis. With on-demand services, customers outsourced both their hardware and software to a third party. Customers would therefore pay for both application services and hardware usage on a need basis. Players such as Siebel and Salesforce.com Inc. were actively promoting their sales force automation and CRM products, delivered as on-demand service offerings, by providing the application service through the Internet with monthly billing cycles. Traditional ERP vendors such as Oracle were beginning to sell their products as hosted service offerings by selling the software license on a one-off arrangement, but charging the hardware usage on a need basis.

Enterprise applications delivered as pay-as-you-go services were attractive alternatives. This model allowed customers to significantly reduce the total cost of ownership of enterprise applications (i.e., the up-front investment in hardware, software, services and supporting staff,

and ongoing maintenance costs), to increase flexibility and responsiveness to the changes in their business models, to switch easily to other vendors without significant attachment, and to provide updates centrally without deploying an army of consultants to install new releases periodically.

Nonetheless, in order to deliver such services, enterprise applications vendors would need to either partner with someone who could provide scalable hardware and network connections, or invest in building their own supporting infrastructure. Moreover, as companies were not required to buy the licenses of the applications software under this service provisioning model, the sales of software would likely be impacted. Hence, software vendors would need to carefully calculate the pricing models and ensure the sustainability of the services.

VII. SAP'S NEW STRATEGIC POSITION AND BUSINESS DESIGN

As companies modified and upgraded their enterprise applications more frequently, the software had to be simple to implement. Additionally, customers could no longer wait for software updates available only in a rigid schedule. Besides the changing market conditions and customer requirements, the growth rates of the enterprise applications market had been saturated, particularly among large multinational companies. Major vendors were consolidated into a handful of players. Moreover, the market growth had significantly decreased since the end of the dotcom boom. Enterprise applications players were required to expand into new functional areas and industries. To anticipate the shifts in industry dynamics in the 21st century, Chairman and CEO of SAP, Henning Kagermann, led the company to pursue a new business strategy. This strategy had fundamentally altered SAP's existing business design, i.e., the totality of how SAP would define its functional coverage; select its industry focuses and market segments; develop targeted product offerings; and configure its resources to support the new design [Slywortzky 1996].

EXPANSION OF FUNCTIONAL COVERAGE

As the market leader in the fast-saturating ERP market, SAP enjoyed a steady stream of recurring licensing and service revenue provided by its huge installed base. Under increasing pressure from its investors to pursue new areas of growth, SAP leveraged its prominent position in the traditional ERP market, and expanded into related new areas including CRM, PLM and SCM. The expansion of the product lines had particularly intensified the competition between SAP and its archrival Oracle.

DEEPENING INDUSTRY KNOWLEDGE

Following Oracle's acquisition of its ERP rival PeopleSoft, SAP acquired TomorrowNow, a PeopleSoft support firm, in an effort to lure customers away from Oracle. In early 2005, SAP agreed to acquire retail software specialist Retek, but it was eventually outbid by Oracle. In mid-2005, SAP acquired Lighthammer Software Development Corp., a manufacturing software maker, to bridge the gap between its back-office applications and shop-floor production systems. Although the costs associated with these acquisitions were relatively small, such moves symbolized the growth challenges facing global enterprise applications companies. As the market of enterprise applications was saturated, the players began to look for ways to attract new customers. In order to penetrate various niche markets and meet the specific needs of these smaller customers, enterprise applications vendors needed to source niche software products in more targeted segments, such as retailing or banking, to complement their existing cross-industry products. By providing customers with functionality specific to their industry, SAP hoped to lure new customers and get them locked into the SAP product family.

PENETRATION OF MID-MARKET

Although SAP's reputation was based on serving the world's largest enterprises in the Fortune Global 100 list, in actuality two-thirds of the software company's business was contributed by

small and mid-size customers (defined as those with annual revenues of US$600 million or less) [SAP 2005]. To strengthen its position in this mid-market, SAP released two scaled-down versions of its ERP product designed specifically for small and mid-sized businesses, as well as the complementary software development tools and services. These two solutions were mySAP All-in-One and SAP Business One. Besides the lower-priced products, SAP was in the process of rolling out pay-as-you-go offerings in 2005. The first of such offerings would be a CRM offering combining elements of both hosted and on-demand computing to win small and mid-size customers with an attractive pricing model [Blau 2005].

DEVELOPMENT OF NEW FLAGSHIP PRODUCT OFFERING

In 2001, SAP acquired a technology start-up in Silicon Valley called TopTier Software and hired its CEO, Shai Agassi, as the chief of corporate product development. The dynamic executive subsequently led one of the most daring corporate campaigns in SAP's 33-year-old history—to open up the proprietary software through its new technology, namely NetWeaver.

In view of the increasingly heterogeneous nature of the computing environment, SAP determined to address the IT industry integration issue. After putting in more than US$1 billion in research and development, SAP introduced NetWeaver—an open platform that allowed applications to be developed and accessed as Web services. This new technology was designed to link up various applications (packaged as Web services) running on different systems, from legacy mainframes to Internet-enabled devices and enterprise applications. By leveraging NetWeaver, SAP was able to break up its software products into open and modular pieces. Customers could then pick and choose the specific SAP Web services modules that met their own needs. Moreover, customers could add in modules developed by other companies as long as these products met the specifications of the NetWeaver framework. As a result, customers could more rapidly create and modify their own applications, improve the overall fit of the applications, and reduce the associated development costs incurred.

Since the software products would be broken into smaller chunks, SAP could change the mode of delivering new features and functions for their products. Rather than waiting for massive releases to take place periodically (minor releases could take months and major releases years), the Web services approach would allow constant updates of the software products.

With this new engineering approach, SAP had solicited tremendous customer support. In 2003, SAP began to release the early version of NetWeaver as free bundled software in order to bridge SAP and non-SAP software programs by reducing the need for building customized links. The full version of the software was scheduled to be launched in 2007. By mid-2005, more than 1,300 customers had already tested NetWeaver and some of them were highly satisfied with the product and would welcome the opportunity to recommend the product to future buyers.

Although NetWeaver had not contributed to SAP's revenues yet, if it were able to maintain this momentum and succeed, the technology could transform the development approach of business applications in the coming future. By leveraging the universally accepted platform, thousands of individual developers could develop specialized modules that would serve highly targeted industry segments, traditionally too fragmented to be addressed with the old one-size-fits-all approach. This was particularly important for SAP in penetrating the millions of new small and medium-sized enterprises around the world.

CONFIGURATION OF RESOURCES

In order to realize its platform strategy based on NetWeaver, SAP was required to foster a new ecosystem. In the past, SAP mainly relied on its internal programmers (mostly residing in Walldorf, Germany) to develop its products. With the new NetWeaver platform, the software company would need to change from being an industry introvert that focused on its supreme engineering capabilities to an extrovert that could attract tens of thousands of individual developers in joining the virtual development network. To address such dramatic shifts, SAP

lured George Paolini in early 2005. Paolini was the executive who successfully marketed the Java programming language for Sun Microsystems Inc., and who was brought in build the developer networks and communities. As of mid-2005, there were already 132,000 individuals who formed part of the online network. Besides building the virtual taskforce, SAP also recruited about 200 top managers from competitors such as Oracle, BEA Systems and Siebel Systems to join the company.

VIII. LOOKING AHEAD

With NetWeaver as the centre of SAP's new strategy, the software giant was ready to leverage its engineering excellence and to embark on a new path of growth. Nonetheless, the new pricing structure of SAP's products based on the NetWeaver technology was yet to be disclosed to the public. Potentially, with the new modular approach, customers would source less from SAP and increase purchases from other players as long as these products were able to connect with the NetWeaver platform. Moreover, as many existing partners were also developing their own rival programs on Web services, NetWeaver would take SAP into new battlegrounds and force the company to compete with some of its most trusted partners including IBM and Microsoft. Consequently, this could jeopardize the existing relationships and reduce future business opportunities brought by these partners.

The most prominent threat to SAP would be from its archrival, Oracle. Following its shopping spree in company acquisitions, including PeopleSoft and Siebel Systems, Oracle was in a much better position to put SAP on the defensive. In particular, if its existing applications and database software would successfully combine with the features and functions brought by the newly acquired companies, Oracle could offer the most comprehensive and integrated enterprise computing platform to be found in the industry.

Battles over acquisitions and invasions of new markets made by SAP, Oracle, Microsoft and IBM marked the dawn of the platform war in the enterprise software industry. Most customers would likely switch to (or remain with) one of the four platforms provided by these major software makers. For SAP, however, the immediate challenge was to convince the software developers and systems integrators around the world to work on its NetWeaver platform. As of mid-2005, there were 150 third-party programs already built for NetWeaver, and the number would exceed 500 in 2006, according to SAP. Nonetheless, the strengths of the German software company had been in its hardcore engineering. The question remained whether SAP would have the tenacity or clout to attract the global army of independent developers in supporting its platform strategy.

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