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NetWeaver – Open Lock-in?

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Why you need to read this

This paper is intended to supply CIOs with information needed to critically assess their investments in middleware in an SAP environment. Middleware investments have become strategic: they have a long lasting effect and significant money will go into these investments over time. Correcting a wrong decision can border on the impossible or can be at least, expensive and complicated. Settling with a compromise can embarrassingly limit your company's ability to embrace the future.

SAP has been immensely successful with its enterprise application software. Over more than twenty years, the core of its applications has grown in function without a major architectural overhaul. While SAP has added many advanced components, the original application paradigm has been left unchanged.

The result is a suite that is more complex and far more expensive to operate than competing products with more recent architectures. SAP is aware of its two most critical issues: the need to free customers from their current cost and complexity, and to deliver a new architecture to carry them into the future. SAP needs to reinvent its business.

Hence, in the years to come, SAP is planning to restructure its product set around a new architecture based on the proprietary NetWeaver platform. This service oriented architecture (SOA, or, in SAP speak, ESA) is bound to have far reaching consequences for SAP's products and hence for SAP customers. SAP plans to introduce this shift in a series of steps that are likely to cost between three and six times the license cost of current R/3 installations. There is the likelihood that SAP will need to charge for upgrading current licenses, in a similar way to the transition to mySAP.

What does this mean for customers? What are the inherent risks of deploying this new technology? Will it truly be able to deliver on the promise of a SOA? Please read on to discover more.

The State of Application Architecture

ERP software has gone through several evolutionary steps. Initially, the goal was to create synergy and agility by replacing as many business applications as possible with a tightly integrated suite operating on a single database. While significant productivity advantages were gained from this approach, it became apparent that it was impossible to integrate all required functionality into one tightly integrated product for a number of reasons:

- Customers required new functionality at a faster pace than SAP could deliver within the boundaries of its architecture.

- Mobile applications were hard to fit into the scheme of SAP's tightly integrated real-time applications.

- New applications such as CRM or SCM required data model variants that were hard to accommodate..

Much to its chagrin, SAP also found out that

- Customers preferred to operate proven legacy applications for economic reasons

- Niche application vendors gained were at least temporarily successful in select application areas.

On the other hand, new requirements emerged. Once again in the history of computing, it became apparent that purism does not prevail. Like the all-out MVS or Unix strategies, which rarely were fully implemented and never lasted, the company that has replaced all applications with products from a single vendor has yet to be found. The increasing number of mergers and acquisitions has also contributed towards patchwork application environments being the norm.

When the Internet started to impact business practices, the industry was quick to create a new set of flowery buzzwords. The most important one here was "collaboration" meaning that enterprises (and the associated business applications) would communicate in some form to establish processes that crossed enterprise boundaries. It was almost immediately clear that such a concept could not be successful if there was a requirement to have exactly the same business software on all ends of the collaboration.

The tightly integrated client-server business software that currently dominates the market has been

- A vast success in that thousands of enterprises and millions of users now have a better base for running conventional business models than ever;

- A tremendous disappointment when looking at the original expectations;

- A total failure with regard to guaranteeing ongoing business agility and economy to its users;

- A nightmare in terms of resource consumption both for implementation and ongoing operation.

All in all, it is clear that there is no room in the current state of an economy that is in an ongoing struggle to cut costs, to repeat the monstrous SAP implementation projects of the nineties. What we need is a concept that is both flexible enough to embrace the past application paradigms and powerful enough to enable the ongoing evolution of business practices. The new standard is not about obliterating the world with the same applications but rather, and much more realistically, to leverage what is proven and works and pave the road again for much needed innovation that has been stifled by the prevailing application paradigm.

Why Service Oriented Architecture can help

It would be ideal for both users and the industry to replace the current solutions lock, stock and barrel by new software that complies with modern engineering standards and that supports both new and established business practices equally well. However, it is absolutely impossible to resort to such an option. The millions of person years that went into the creation and implementation of today's applications cannot be spent again. Unless the industry develops a magic wand that automatically transforms these investments (including the skills of all persons affected), a radical switch to a new application generation, no matter how desirable, remains an illusion.

This situation is similar to urban architecture. Wars and disasters aside, there is little chance to redo whole cities from scratch. It is too costly, too risky, and too disruptive.

What we need is an architecture that leverages both our investments in existing solutions, and the potential of newer technology such as the Internet, in a way that allows us to regain agility and to move forward to newer business practices.

This is the basic idea of the "Service Oriented Architecture". Ideally, SOA has to support ALL pre-existing applications, connect to all applications of the future, and evolve as newer requirements arise.

The SOA concept applies both to the construction of new applications and to the integration of any form of legacy solution. It interconnects applications and institutions, giving business precedence over technology. At the same time, it must permit maximum exploitation of technology wherever business requires it. In more technical terms, SOA can be described as being

- Componentized, providing standardized services interfaces for applications and resources

- Interoperable, allowing for easy information exchange between applications an/or resources

- Modular, permitting mix and match, adding or removing of business processes and infrastructure components

- Scalable, giving users the option to embrace current solutions and to add resources as required while adapting to load and availability requirements.

SOA acknowledges the fact that application environments are subject to constant evolution. Since the balance between continued usage of existing solutions and the transition to new applications is very specific to the situation of any enterprise, SOA has to be as open and as unbiased as possible.

The concept of SOA goes beyond integrating new applications into existing environments. It paves the road for new business paradigms such as collaborative business scenarios. They require applications to interact flexibly across enterprise boundaries. This takes the "Best-of-Breed" concept frequently discussed to a new level: As it is inconceivable to standardize on one set of applications world-wide across all industries, it is important to find a way to establish communication between applications in a way that is based on standards.

In addition to providing standardized technical means for this communication, it is essential to provide better and standardized tools for mapping the business logic to the underlying software. This is best done by structuring business cases into processes that have a clear relationship with the software used to execute them. These process definitions are the new "lingua franca" of collaborative business. The Business Process Execution Language (BPEL) is an essential foundation of collaborative business. Of course, it is not restricted to inter-enterprise scenarios – it can be used equally well for classic application scenarios.

While collaborative business certainly is an exciting new opportunity to structure business, it increases complexity considerably. SOA and the associated standards reduce risk and complexity, but they do not eliminate it. Hence, it is important for enterprises to start exploring the new potential now. Easy and straightforward classical application integration scenarios on a tactical level are a good start if you can rely on the safety of proven and standards-compliant middleware that permits you to progress to more strategic scenarios. It is important though to understand that

- SOA is a strategic base for new business paradigms

- These business paradigms require maximum interoperability

- For many industries, support of these paradigms will be key to survival

- SOA, like all technologies, has a window of opportunity. It will also be the base for the "next big thing" making it very difficult to leapfrog this era.

In the context of middleware stacks, standards compliance means that the user can freely integrate programs and tools from a broad offering and that he has support for collaborative business scenarios. The importance of standards in the context of a networked society can hardly be overestimated. Collaborative business is a way of leveraging the Internet for business. In its extreme form, it will allow the forming of an unlimited number of groups that freely engage in business with the same level of ease we have when using services like ebay today. This can be best illustrated by an example. Let us imagine in world in which the five stack vendors BEA, IBM, Microsoft, Oracle and SAP have an equal amount of customers and there are no common standards that would allow interoperation. In such a world, collaborations could only happen within the environment of each of these vendors even though all would use the Internet. According to Reed's Law[1], the value forgone by not being able to freely interoperate is huge: e.g with only 10 users for each of these stacks, free interoperation would increase the value of these collaborations by a factor of up to $2*10^{11}$. This is hard to imagine, but the Internet has proven such value propositions to be right. It dramatically highlights the importance of standards as they allow customers to maximize benefits in a network.

Generally speaking, standards compliance can only be taken for granted, if the vendor of a commercially available product guarantees it and if he has no other agendas. SAP's foremost goal, however, is to service first its huge installed base by effecting better integration among its own products. As NetWeaver has a key focus on support for SAP's own, ABAP-written legacy products, compromises are inevitable. Moreover, an honest-to-goodness SOA environment would liberally enable any best-of-breed scenario conceivable provided the scenario can be accommodated in a standards-based world. For SAP such a scenario would be counterproductive to selling its own suite of products. Hence, SAP will

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[1] See David Reed, Context Magazine spring 1999, " The Weapon of Math Destruction" and "That Sneaky Exponential—Beyond Metcalfe's Law to the Power of Community Building". A more trivial example may illustrate this further: telephone communication would be extremely limited if it could only happen between owners of the same telephone model.

support the creation of standards but exercise governance implementing them, carefully aligning its actions with its own commercial goals.

This becomes apparent when classifying stack vendors with regard to their heritage and business interests (see Figure 1).

Vendor	Middleware Experience in Open Market	Application Business	Stack used by Competing ISVs
IBM	+++	---	N.A.
BEA	+++	---	N.A.
Microsoft	+++	+	+++
Oracle	+++	++	++
SAP	---	+++	---

+++	strong experience, strong presence, frequent usage	---	weak experience, weak presence, infrequent usage

• Figure 1 Positioning of middleware vendors (Source: SPI)

Why does SAP engage on Middleware?

SAP has to solve two important tasks: re-integrate its different applications into a single and cohesive environment and to allow users to leverage the concept of SOA.

The re-integration is an overdue step. In the mid-90s, SAP saw emerging niche vendors like Siebel and I2 starting to offer functionality at premium prices not available from SAP, reducing SAP's share of wallet. Moreover, these vendors started to propagate a new, and for SAP unpleasant, paradigm called "Best of Breed". Key customers such as Siemens became quite intrigued by this concept that offered more choice in the market. SAP reacted by launching a series of applications (then under the moniker of "New Dimension"). Customers, of course, then expected the same integration quality they knew from previously launched SAP functions, but no matter how hard SAP tried, these new products could not share the tightly integrated application core of R/3 for a number of reasons. Some of these are:

- **Limited accessibility:** R/3 requires constant access to its one and only database. This makes mobile applications, that are often offline for some time, impossible.

- **Poor flexibility:** R/3 does not have sufficient flexibility in its data model to accommodate extra requirements from applications like CRM.

- **Lack of analytics:** R/3 takes the world at face value. The "R" in its name stands for "real time". Every data item entered is real. Hence, there is no room for "what-if scenarios". Furthermore, analytical work often requires intensive work that can slow down transactions considerably.

- **Adaptability issues:** R/3 is a transaction processing system. Such systems include recovery features that are essential in mission critical environments. The Internet, however, makes it difficult to provide transaction processing states. Moreover, the classical R/3 user interface was not optimized for the Internet.

SAP implemented a number of extensions to their core system and created separate environments for their CRM, SRM, SCM, and Business Warehouse products. Each of these systems requires its own database. Rather than having one tightly integrated multifunction product, SAP now has a suite of products that behave like "Best of Breed"

from a single vendor. Customers that want to make use of all the new extra functionality face "server inflation". The following example, taken from a real SAP customer in Europe, shows what happens in such a case.

Today, this customer has 3500 SAP users on a single production system. The customer wants to consume his mySAP Business Suite contract that includes CRM, SRM, Business Warehouse and HR. He also has to change his own organization to comply with his own business issues. Normally, this would have resulted in five more production systems and five additional test- and integration systems bringing the total to 12 R/3 systems. Since, however, all the new SAP products on the customer's list require their own production and test- and integration systems, he ends up having 56 mySAP systems!

	Division			
SAP Application	**Holding**	**A**	**B**	**C**
Enterprise (R/3)	X	X	X	X
EBP	X	X	X	X
BW	X	X	X	X
HR	X	X	X	X
CRM		X	X	X
SCM		X	X	X
SRM		X	X	X
SMB System		X	X	X

● Figure 2 Today, customers need too many SAP systems

This creates tremendous challenges for the infrastructure: these systems need to be managed, upgraded and maintained. The increase in both complexity and TCO is dramatic.

While SAP was very successful in selling license upgrades to mySAP, customers are reluctant to actually implement these. Hence, the fact that over 50% of the installed base has purchased mySAP licenses does not reflect at all what level of applications these customers are actually using on their production systems.

SAP Versions Installed 5/2005
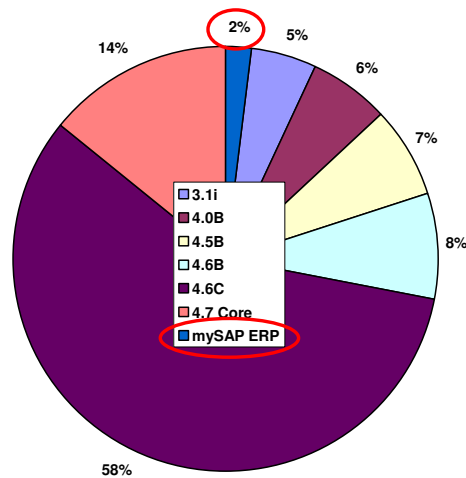

Source: Strategy Partners International

• Figure 3 Most of SAP's installations are not running mySAP

Although SAP has announced that at the end of 2006 standard maintenance for all versions lower than 4.7 will be terminated, most customers are still reluctant to move.

Why do customers not move on to mySAP, even those that have bought the licenses? Here are the key reasons:

- Customers do not find enough new business functionality to justify migration costs. Either they are waiting for SAP to either offer missing and required functions or their business is already well supported with what they have.

- SAP has not yet provided all industry solutions on mySAP. In some cases, customers are forced to remain on out-of-maintenance versions because the port of the industry solution will only become available in 2006. Even then, customers may elect to defer migration to a time when the newer releases are stable.

- Customers have not upgraded their license to mySAP. This upgrade costs extra money (it was designed that way). Under their R/3 license agreement, they can still migrate to 4.7 which will be supported until 2009 under standard maintenance.

- Rather than expediting implementations, they are waiting for THEIR business to justify extra costs.
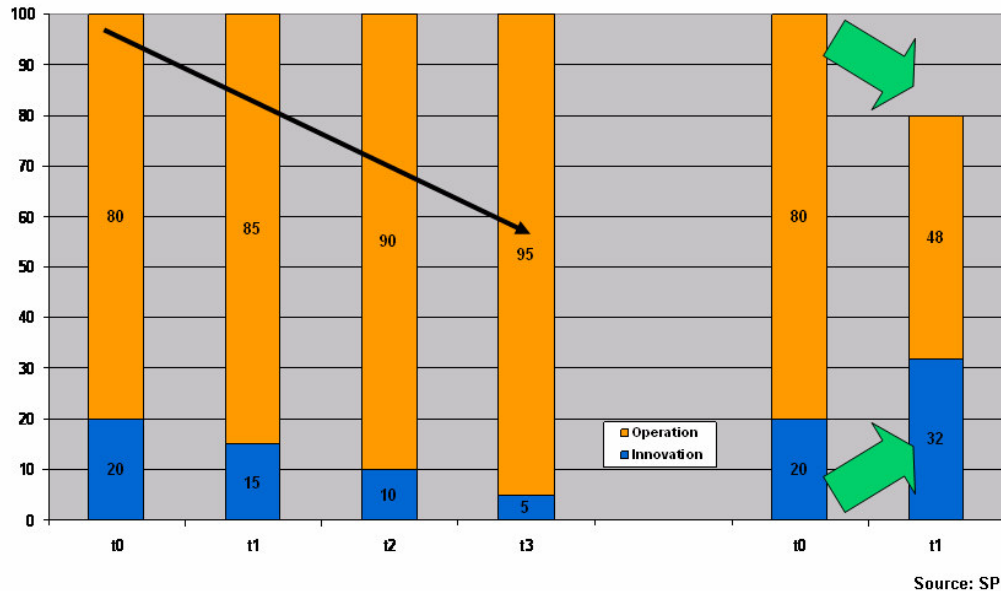
- Figure 4 Cost of operation needs to come down to give customers room for innovation

The key impediment here however, is that IT budgets are under tremendous squeeze. Moreover, strict alignment with business has become de rigueur. Typically, the lion's share of the IT-budget today goes into operations, not innovation. SAP has recognized that the way their products are structured today leads to an erosion of their customers ability to innovate. As the usage of more SAP software tends to introduce more complexity, thus increasing costs of operations, IT budgets leave less room for innovation. The very ugly and even paradoxical bottom line is that innovating with the classical SAP products deprives customers of their capability to innovate in the mid-term. SAP intends to use its NetWeaver middleware extensively to reduce complexity, improve integration, and, finally, lower cost of operations to free resources for more innovation.

It is, however, worth noting that it is very questionable that this effect can be realized in the first three or four years of such a transition. NetWeaver in itself is an investment even though SAP bundles large portions of it into its products. Customers need new skills, have to acquire hardware and set aside capacity for implementation and migration. For all this,

they have to obtain funding from their management. Like any additional piece of complex software, NetWeaver adds to complexity first and only later can it potentially fulfill on the promise.

SAP plans to use NetWeaver not only for the integration of its different products but also as the middleware foundation for a new application generation. This new generation will have software services as the key building blocks. These services will be created partly from existing SAP legacy code and partly from newly created programs. As SAP customers have invested billions into modifications and add-ons for their systems over the years, any big-bang type migration to a radically new system is impossible. Instead, SAP plans to carry its to date fairly immobile customers through a set of version migrations in several undisclosed steps to a services-based product.

Cost of yearly upgrades after migration to mySAP
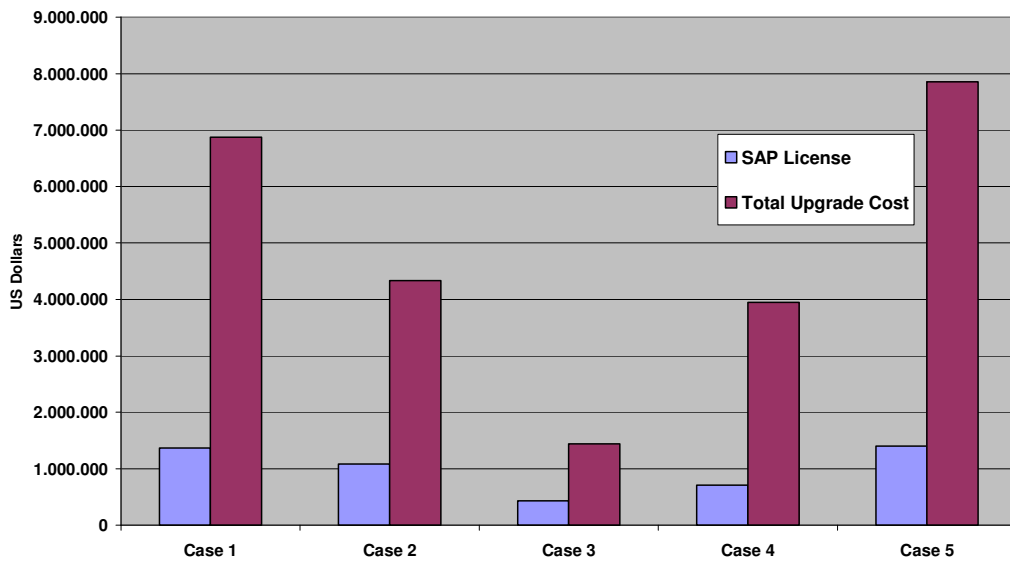
• Figure 5 Migration costs make constant evolution expensive (Source: SPI)

This will result in the largest application migration in the history of computing. It will require a number of interim steps that are compromises on the way to the future. While they are essential for this multi-year evolution, they are expensive, too. Judging from past migration costs, we estimate this process will take between six and eight years and five migration steps costing three to six times the price of the original license.

In theory, SAP could have licensed middleware from established vendors such as BEA, IBM, Oracle, or Microsoft[2]. It can be assumed that most SAP customers would have appreciated an approach that would allow them to employ the middleware stack of choice leaving their options open. SAP took that route for R/3 with regard to the operating system and the DBMS resulting in a set of applications that did not create difficult infrastructure discussions. This added very much to the success of R/3. While supporting alternative middleware stacks is attractive for users, it creates some issues for SAP:

- SAP would have to create an abstraction layer to support the key stacks as they are not freely interchangeable. In particular, there is a very significant difference between the J2EE compliant stacks and Microsoft's .NET. The abstraction layer is both technically demanding and potentially performance degrading.

- Using third party stacks makes it more difficult to build composite applications that support both ABAP and J2EE.

- Two of the middleware stack vendors (Microsoft and Oracle) are also competitors. SAP has always been aware of this constellation and is not at all keen to extend its exposure beyond what is already inevitable today.

- Since SAP intends to use the NetWeaver middleware stack in all of its installations, SAP would have potentially had to pay significant license fees to source a third-party stack on an OEM basis. If SAP would require its customers to source directly from the stack vendors, the already high SAP costs of operation would go up without SAP receiving any additional revenue.

Additionally, SAP was little incented to employ a third party stack unlike the days when R/3 was introduced. SAP feels that it now has the clout to displace competing stack vendors. In owning the stack, SAP aims to change its position further. SAP wants to occupy space beyond the established standards for Web Services in order to create its own, very proprietary eco-system. The key elements here are business processes that today are supported functionally by SAP's software products. SAP wants to create business process

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[2] In an interview published in Computerwoche of 6/24/2004, Peter Zencke, SAP board member responsible for research, said: "We cannot develop our products for the infrastructure platform of another vendor. Customers need the certainty that all the underlying layers function without problems." (Translation by SPI)

libraries that other software vendors can build their applications on. Since it is not likely in the foreseeable future that standards will embrace SAP's process definitions, the result will be a form of application orchestration that runs only in an environment supplied by SAP. This environment, the Business Process Platform, will have extreme customer retention power further extending SAP's market presence.

NetWeaver also gives SAP the option to employ very different pricing models, based on metrics. In order to use metric-based pricing, SAP has to measure, monitor, and audit a great deal more than is done today. Many of these metrics are based on business performance indicators such as number of employees, revenue, and number of orders processed. NetWeaver in conjunction with the SolutionManager (a component mandatory for all mySAP environments) knows these metrics and makes them available for SAP's quarterly license audits. SAP may use these metrics acting as a collection agent for the ISV partners in its planned Business Process Platform ecosystem. In the end, SAP may know more about its customers than the tax authorities. This is certainly a novelty in the software industry.
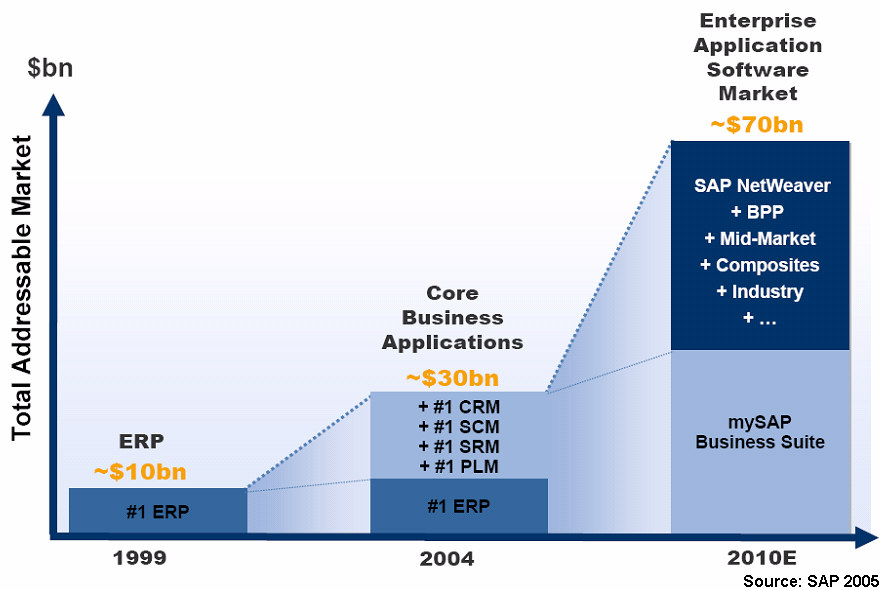
• Figure 6 SAP sees vast new opportunities for revenue.

Is SAP likely to Succeed?

SAP could score a success with NetWeaver if and when several key areas are addressed:

- NetWeaver enables easy and seamless integration between SAP's products on all levels (people, information, processes)

- NetWeaver is accepted as the de-facto standard by most of SAP's installed base

- NetWeaver achieves a significant following within the ISV community

- NetWeaver is competitive with regard to standards compliance, features, performance and maturity with the leading and established middleware products.

SAP has several factors working in its favor. Among those are:

- The need to change SAP's application architecture is strong and correctly understood by the company's management.

- SAP is financially well equipped to allocate resources.

- With its huge installed base, SAP has the economics in place to make such a huge endeavor possible.

However, there are also some significant caveats that SAP must overcome:

- In terms of functions, performance, and robustness of NetWeaver, SAP is behind its competitors in experience. It takes many years to learn how to make robust and scalable system software that can be supported economically. Even a long established part of NetWeaver like the Business Warehouse, which has been installed several thousand times, is still behind in performance when compared with other vendors' products. As Alice Woodward from Ovum puts it: "In the case of SAP BW performance we hear more often of problems than with products from other vendors."[3] It is especially components like the Java part of the Web Application server, the portal, and the XI integration suite where experience counts.

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[3] Quoted in www.silicon.de "Verändern SAP und Microsoft den Markt für Business Intelligence? By Martin Schindler, 10/9/2005. Translation by SPI.

Whereas all leading application server vendors have been benchmarked by SPEC[4], SAP is still conspicuously absent. It is not just that SAP started years later, the number of production installations with heavy load and mission critical applications are also vitally important.

- While NetWeaver has the potential to become a part of a mission critical infrastructure, SAP's leading competitors are much more experienced in this space. Here, IBM is the clear leader. WebSphere as a brand has been in the market for 7 years, but it is based on middleware experience that has set the standard for scalability and robustness in business computing for over 40 years, supporting the most demanding applications. The focus was always on the customer and support for IBM-written code was secondary. Today, the accumulated lessons of many decades of middleware business are part of any aspect of IBM's offerings. A vendor like SAP, new to this type of business, will inevitably have to go through a learning curve at a cost to customers and partners. In 2004, IBM sold new Application Integration and Middleware (AIM) new licenses worth $2,495.4 million[5] compared to SAP which sold $76 million of "NetWeaver and related products"[6]. Apart from this huge difference in new license revenue, IBM as the market leader has a huge ecosystem that is up and running in 164 countries with over a million developers. Over 87,000 customers are using WebSphere branded products. Even with SAP's huge presence in the enterprise applications market. it will take many years for SAP to be able to play in the same league. Competing here will cause SAP to allocate resources that would be best used to migrate its core application products into an open world while protecting customer investments – a difficult enough task in itself.

- For many years to come, SAP will first and foremost have to address the requirements of its installed base, which accounts for over 80% of SAP's business. Almost all of the SAP supplied code of these installations is ABAP. SAP will have

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[4] SPEC, Standard Performance Evaluation Corporation, see www.spec..org

[5] See http://www.gartner.com/press_releases/asset_124729_html. (Gartner press release)

[6] Source: SAP's finacial data for Q3/2005. These numbers are based on SAP's statistics on planned customer usage as most of this revenue came through selling mySAP product bundles.

to invest in supporting ABAP for many years to come. SAP has chosen to use the same application server for both Java and ABAP which we believe dictates architectural compromises not necessary in the pure play Java environments of SAP's competitors.

- The primary reason SAP is building NetWeaver is to support SAP's software products, or, as SAP's Peter Zencke puts it:" We develop infrastructure for our applications – not vice versa". [7] Customers rightfully expect SAP to first solve its integration and software development issues and only then to address other issues like integrating customers' other application suites. As a result, NetWeaver will always having a bias towards the SAP environment. The fact that NetWeaver has to support the classical SAP environment calls for a number of proprietary elements that other environments do not have to accommodate, such as the support of ABAP and Web Dynpros.

- SAP already has experienced several time delays on its way to rearchitecting. mySAP ERP 2006 was delayed to 2007 and will in our view not become broadly available before 2008. This, together with the reluctant adoption of newer releases by customers increases SAP's propensity to miss the market. SAP is fighting these delays by adding more manpower, compromising its financial goals to increase margin to 30%. SAP has hired many experts from Siebel and other competitors to

	Subject	Name	BEA	IBM	Oracle	Open Source	Microsoft	SAP
Portal	Portlet	JSR-168	x	x	x	x	-	-
	Web Services Remote Portlet	WSRP	x	x	x	x	x	-
	Content Management Repository	JSR-170	x	x	x	x	-	-
Dev. Environmt.	Java Server Faces	JSR-127	x		x	x	x	-	-
	Service Data Objects	JSR-235	x	x	x	x	-	-
	BPEL-J	JSR-207	x	x	x	x	x	-

- Figure 7 SAP is behind key competitors when it comes to standards implementation (as of 11/2005)

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[7] Computerwoche 06/24/2004

help with development and marketing of NetWeaver. Integrating these extra staff and getting them productive are sizeable challenges. We expect overstaffing to slow down the projects and adversely affect quality.[8]

- Despite claims of an open SOA via ESA and NetWeaver, SAP doesn't fully support the standards necessary to create a truly open environment. For SAP, ESA is primarily a vehicle to move one very particular set of legacy applications that SAP knows almost everything about into the future. This is very different from the situation of pure play vendors. They have no such affinity to a very specific set of products. Rather, they have to address the world of applications in a much more general sense. This bias is reflected in many details. NetWeaver, for example, only supports workflow among SAP products.

- SAP has to compromise on standards in three ways. First, it is not always economic, from the point of view of legacy systems like ABAP-written SAP code, to rely on standards. Second, not all standards can be implemented overnight. SAP will clearly favor those it needs for itself, and implement these first and with better quality. We can see that today, by analyzing where SAP is behind other competing products.[9] Third, some of the standards are still under development. Here, SAP seeks to push their solutions and get them established as the standard, which is, however, mere speculation. In any event, SAP does not see standards as the base for its products, but rather as a means to build gateways. Says Peter Zencke: "Other technology platforms like WebSphere or .NET may communicate with NetWeaver using open standards. Insofar we enable interoperability."[10]

- As SAP continues to invest in perfecting its products, it will experience a series of pitfalls that were not anticipated. This is normal for new products but the impact here is different: SAP wants to move its products and its customers and get into a

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[8] See Fred Brooks, "The Mythical Man-Month": "Adding manpower to a late software project makes it later." In an interview Peter Zencke gave Computerwoche on 6/24/2004, he stated that over 2000 developers are working on NetWeaver. The current number is certainly much higher; we estimate it to be at between 2500 and 3000.

[9] NetWeaver is behind WebSphere e.g. in the support of J2EE standards (SAP supports J2EE 1.3, IBM supports J2EE 1.4), portal portlet standards (JSR-168 and 170 are not supported by SAP) and the SAP NetWeaver Developer studio has no support for the Java Server Faces standard (JSR-127) which IBM supports. NetWeaver supports J2EE 1.3 whereas e.g. WbSphere is already on J2EE 1.4. We expect SAP to upgrade J2EE support at the earliest in 2007.

[10] Computerwoche 6/24/2005

completely new business area, all at the same time. It needs its customers to move to newer versions employing NetWeaver to pave the road for further add-ons and to mature the NetWeaver set of products. There simply is no substitute to intensive mass utilization of the product. Customers do not migrate their production systems although many have upgraded their licenses.

SAP is for the most part selling application suites and not individual products, largely masking the fact that SAP's installed base is full of shelf-ware. SAP attempts to conceal this fact by publishing encouraging statistics that, in fact, are based only on customers' plans and intentions for future product use. Since NetWeaver is a very broad set of gradually maturing products it is easy to call a client a NetWeaver customer. The oldest part of NetWeaver (and, by now, the most mature) is the Business Warehouse which has thousands of installations. But even here, only a few of the larger customers use it throughout the enterprise. In many cases, it exists side by side with other solutions and frequently it is only partly implemented. There simply is no "NetWeaver wave". In most cases, SAP is starting (quite logically) with NetWeaver in its own "protected" environment interconnecting SAP instances. When non-SAP-applications are added, large amounts of custom code are frequently required. SAP does not offer its own adapters for other applications and sources them from third parties. There is a striking difference between SAP's marketing claims for the support of heterogeneous environments, and reality. As multi-vendor environments are the rule and not the exception for the majority of enterprises, we believe that SAP falls short in this essential area. It is not clear if this gap can be closed even in the next five years, since it would require a different business model that currently is no fit for SAP.

SAP needs NetWeaver in three roles:

1. Attempt to make the life of SAP's customers easier within the bounds of their installed SAP software.

2. Help customers on the way to a new application paradigm (SOA, ESA).

3. Establish a new ecosystem to attract software vendors, system integrators, and other partners.
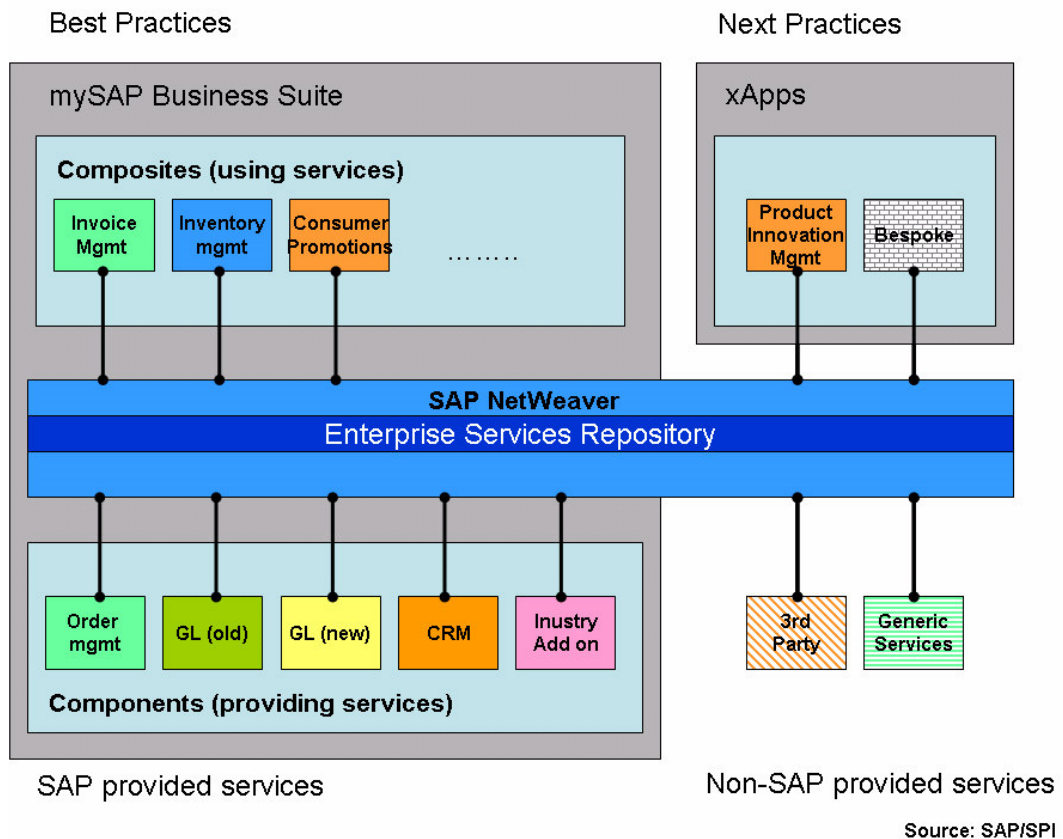
• Figure 8 NetWeaver is the backbone of an SAP infrastructure

In the first role, SAP will hardly face any competition. Here, the issue for customers is to switch to another ERP vendor or to trust SAP that sooner, or, maybe, later NetWeaver will integrate what should have been integrated before. Switching ERP vendors is only a reasonable alternative if any other step would have required equal efforts. It is the rare exception.

In the second role, SAP has to prove to its customers that it has a better overall offering. SAP can leverage its installed application code and claim that it is best positioned to carry these investments forward into a new era. Peter Zencke said on October 11, 2005 in a presentation in Bremen: "What sets us apart from the other stack vendors is not that we provide superior base technology. It is our knowledge of applications". [11]

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[11] He cannot possibly have meant applications in general. The applications he referred to quite rightly are SAP applications.

The third task, establishing a new ecosystem for ISVs, is truly a challenge for SAP. Supporting other applications requires a very different mindset. So far, SAP has dealt with other software vendors always on a dictatorial basis. SAP was the stronger part in these partnerships, prescribing and sometimes even edicting with considerable clout, what partners were allowed to do and what not. Thus many of these partners were actually more DSVs ("Dependent Software Vendors") than ISVs. Over time, some of these partners even lost their status because SAP saw them as competitors, for example CAS AG, a smaller German CRM vendor.

A truly open middleware vendor, however, needs a much more liberal attitude. Vendors like IBM and BEA, having no applications business of their own, have no issue with the nature of the offerings of the members of their ecosystem. Even Oracle and Microsoft are happy to support vendors that offer rival ERP applications – including SAP. SAP has to build up a track record of neutrality. This is not an easy change of attitude and the first attempt actually failed: Baan, now part of SSA, did use middleware technology from TopTier, now part of SAP Labs. At the Baan user event 2002 in Rome, Shai Agassi presented and assured both users and Baan that SAP Portals, a company SAP specifically set up to be an independent middleware player, would continue to service all agreements. Today, SAP Markets is part of SAP, and Baan is using IBM WebSphere. Asked for the reasons for this switch, Laurens van der Tang, then CTO of Baan, stated that SAP's support for Baan was totally inadequate and that there was no hope that SAP would get its business model aligned to support competitors.

In this area, we feel that SAP is unlikely to part from past behavior. The result for the user is that SAP will select what applications will be NetWeaver certified or obtain the "Powered by NetWeaver" status. Those that do not get any status are likely to suffer from low levels of support (making their life difficult).

A related issue is intellectual property: In its standard terms and conditions, SAP claims intellectual property for all software that it was involved with developing. This applies also to customer specific extensions. Even if the customer pays in full for this development, he cannot distribute it to other parties. SAP explicitly reserves the right to replace the extension by other code and charge standard maintenance. Furthermore, SAP does not guarantee APIs used by custom Java code. Specifically for Java-written extensions and

add-ons, SAP also reserves the right to implement similar functions any time maintaining full intellectual property for these. Although not yet enforced broadly, these clauses are very difficult to accept for both customers and ISVs.

At this time, SAP's business model for NetWeaver has not evolved sufficiently to be on a par with its competitors. Middleware is infrastructure and its life cycle is different from that of applications. In order to succeed, SAP must be prepared to sell NetWeaver into totally SAP-free environments or to support NetWeaver even when the customer has decided to stop using his other SAP-applications. These are situations that SAP's support organization is not used to, and where maintenance income is not lucrative enough by SAP's standards. As this does not dovetail at all with SAP's proclaimed intention to increase its margin to 30%, we believe that SAP will try to stay away from such situations.

In summary, we expect it will take SAP several years for its NetWeaver offering to be on par with the current products from rival vendors with more years of domain expertise such as BEA, IBM, Microsoft, and Oracle. SAP will be able to improve its product set faster within its own product environment because it has better access to it, knows more about it, and it is less heterogeneous. It is also the environment where its customers have the highest expectations. Over time, SAP will be able to integrate its product set better with NetWeaver once customers move on to newer versions. To encourage this behavior, SAP will continue to apply significant pressure to customers leaving them with two basic choices: move to mySAP or remain on R/3 and pay the punitively high maintenance support costs resulting from the 5:1:2 program.

It is much less clear if SAP can take its customers down the road to SOA/ESA within a reasonable time. Given the fact that customers are holding back on technology-motivated investments, SAP has to provide compelling business cases that appeal to large parts of its user base and that provide minimum migration issues. It also has to design this path in a way that gives customers the feeling that NetWeaver is open enough to integrate anything around with ease, performance, and robustness, whilst making customers reliably prefer SAP or SAP partner supplied products. Ideally, customers would like to see this happen with earlier availability and higher quality. This, however, does not fit with SAP's track record: SAP has rarely excelled by being first on the market and with superior quality. SAP usually enters the market later, offering more breadth. Hence, we suspect that SAP will

leverage the many non-standard proprietary elements of NetWeaver as a control point to essentially lock-in customers once they are dependent on it for mission critical applications. Total openness is not compatible with SAP's business agenda. Hence, customers who truly want to keep their options open and use one of the key features of SOA, namely the freedom to choose among all the solutions that are standards compliant, will not be able to follow SAP down the road to ESA in all respects. The more attractive applications there are on the market, the more customers will aim to make use of them.

SAP will have limited success with its ISV program. It is easy to persuade partners to use NetWeaver to sell their products into the attractive market that the SAP installed base constitutes. SAP has already signed a number of such partnership agreements. But even here, partners gradually understand that they have to be careful to avoid lock-in. It is much more difficult to win partners that have no direct business interest in integrating with SAP applications. For them, middleware vendors with a mature and proven product line are a much better choice. It is also questionable if SAP's business model will suit these ISVs.

Finally, the ISVs that compete or may compete with SAP will not choose NetWeaver. Given SAP's tarnished track record, we also do not recommend taking any risks here.

The bottom line here is that SAP has huge challenges and a long way to go. With so much on its plate, it is inconceivable that this will be a smooth ride. We expect a series of delays and some quite painful learning situations. In the course of the next five years, SAP's staff will be coming to grips with NetWeaver and learning where it is safe to use it. Out of sheer necessity, we expect this to happen within SAP's product set first.

In heterogeneous environments there is very little chance that SAP will dominate the market in the next five years. This market requires a different view – SAP has to take many things for granted it now has difficulties accepting. The current attitude is that if it is good enough for SAP then it is good enough for everybody. This is no ticket for success.

How should SAP-Users Approach ESA, SOA, and related License Upgrades?

Over the years, many SAP users have forgotten how to weight alternatives. When deciding for SAP, they felt that they could leave such things as strategies and architecture to their application vendor. With this vendor having become so big, powerful, and profitable, this is no longer a very good idea . Hence, the first general advice is to create a plan "B". Just following SAP's recommendations has proven to be costly and complex. Only with a constant view on market alternatives it is possible to have a rational decision making process.
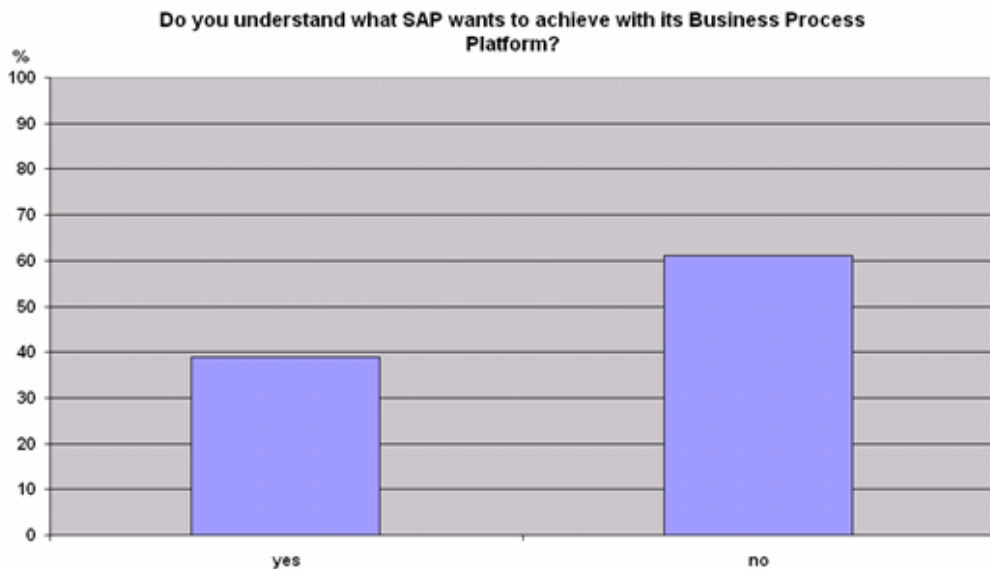
● Figure 9 Most CIOs are unclear about SAP's strategy (survey of 100 European CIOs)

Many users have not yet fully understood what SAP wants to achieve with ESA or the Business Process Platform. Here, SAP's strategy is to get users to start as soon as possible (SAP: "Start early") with smaller, less important projects and to develop in parallel a fantasy for corporate deployment (SAP: "Think big!"). In part, we endorse this message but we urge customers not to limit this to SAP products unless they know with absolute certainty that the infrastructure will only ever be used in conjunction with SAP- and SAP-certified products.

The very first question SAP users have to ask themselves is whether their current SAP implementations functionally require migration to mySAP. They also need to be aware that mySAP licenses are structured differently. They do not reflect the openness that SAP appears to offer in its marketing presentations. Users who are still on old R/3 contracts without functional requirements to upgrade to mySAP can safely migrate to 4.7 under their maintenance contract, provided industry solutions they use are available. If not, extending maintenance, albeit for extra money, is an option. We expect problems with 4.6C to further decline – it is a very stable product. Hence, canceling maintenance contracts is worth a consideration. Third-party maintenance is an emerging option, offered by SAP's recent acquisition TomorrowNow for PeopleSoft/JDEdwards/Siebel (now Oracle) products[12].

When moving to mySAP contracts (even if continuing usage of R/3, which happens a lot), customers need to scrutinize their new license agreement (including terms and conditions and the current applicable price list) carefully. As standard practice, SAP reserves the right to change pricing any time. This, together with SAP being able to audit its customers on a quarterly basis, can create many unpleasant surprises making precise budgeting impossible. Customers should try to get SAP to agree to use the current prices for a fixed term of reasonable length (we recommend five years). This will be easier for larger accounts.

Customers heading towards implementation of an SOA should first resolve any issues around organizational design before resorting to technology. Throwing modern technology at business paradigms of the past is a waste of resources. Then, they should carefully investigate their needs for openness, robustness, and performance. If in doubt, assume those requirements to increase with accelerating speed. Openness does not only mean to be able to integrate products that are now on the market or that will be commercially available, but it also means leveraging the treasures of past IT-eras. Many bespoke applications, running in "old-fashioned" environments still contribute significantly to the application portfolio of many enterprises. They cannot and they should not be discarded easily.

Only if such requirements can be ruled out with certainty, is it safe to use NetWeaver in its current and planned guise. Even then, customers should apply care when developing code

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[12] SAP has told customers, who terminate maintenance that they will have to pay for the time without maintenance if and when maintenance is resumed at a later date. We do not think that this position is legally sustainable.

for this environment: code that will only function in an SAP environment by design and that never will be ported to anywhere else is relatively safe in that it is only vulnerable to interface changes that SAP creates. Code, however, that is meant to be portable to other J2EE-environments has to be designed and programmed in a way that it uses only the standard-compliant subset of the NetWeaver interfaces. This requires very disciplined usage, extra validations, and it may mean compromising on execution speed and programming efficiency.

If, however, openness, speed, and robustness are required and legacy environments such as CICS, COBOL, or RPG are to be tapped, then NetWeaver is definitely not the right choice. Products like WebSphere or WebLogic that were "raised" in such environments are far better suited. In such cases, customers should either integrate their R/3 installations using such "honest-to-goodness" products, if required to use mySAP, keep NetWeaver usage strictly to the SAP environment by using the interconnect functions offered for WebSphere or .NET. They should, however, carefully analyze licensing impacts: SAP charges extra license fees and maintenance for access from "the outside world". Some large customers, however, have been able to negotiate this "integration toll" away. The following table (Figure 10) summarizes some of the key options. As always in such complex cases, this is only a high level navigational aid in this jungle.

Starting Point	mySAP License	Business Requirement for mySAP	Requirement for Openness	Portal and Middleware Requirement	Strategy
4.6C and earlier	no	not at this time	not at this time	not at this time	Extend maintenance or go to 4.7
	no	not at this time	not at this time	yes	Extend maintenance or go to 4.7, evaluate portal and middleware products broadly
	no	not at this time	yes	yes	Extend maintenance or go to 4.7, evaluate portal and middleware products with strong focus on non-apps vendors
	no	yes	not at this time	not at this time	Migrate to mySAP 2005, evaluate portal and middleware products broadly
	no	yes	not at this time	yes	Migrate to mySAP 2005, limit NetWeaver deployment to keep options open
	no	yes	yes	yes	Migrate to mySAP 2005, evaluate portal and middleware products with strong focus on non-apps vendors
	yes	not at this time	not at this time	not at this time	Extend maintenance or go to 4.7
	yes	not at this time	not at this time	yes	Extend maintenance or go to 4.7, evaluate portal and middleware products broadly
	yes	not at this time	yes	yes	Extend maintenance or go to 4.7, evaluate portal and middleware products with strong focus on non-apps vendors
	yes	yes	yes	yes	Migrate to mySAP 2005, evaluate portal and middleware products with strong focus on non-apps vendors
mySAP	yes	yes	not at this time	not at this time	Depending on required functionality migrate to mySAP 2005, limit NetWeaver deployment to keep options open
	yes	yes	not at this time	yes	Extend maintenance or go to 4.7, evaluate portal and middleware products broadly
	yes	yes	yes	yes	Extend maintenance or go to 4.7, evaluate portal and middleware products with strong focus on non-apps vendors

- Figure 10 Alternatives depend on circumstances (Source: SPI)

Over time, SAP will evolve its NetWeaver platform. It is admittedly a risky undertaking, so risky that not too long ago all three of SAP's founders that still hold major stock positions were willing to sell their shares to Microsoft. As SAP's ex-CEO Dietmar Hopp (one of the founders) put it in June 2004: "SAP is safe for five years. In a constellation with Microsoft, it may have been safe for 20 years to come."[13] We speculate that the risks of the upcoming migration of all of SAP's products to a new architecture were a significant part of the motivation of the three senior gentlemen to sell their stock. The migration from R/2 to R/3, albeit much smaller and less risky, was a long; nerve; time; and money consuming exercise that took SAP to its limits. Repeating this cliffhanging experience was not what they wished to do.
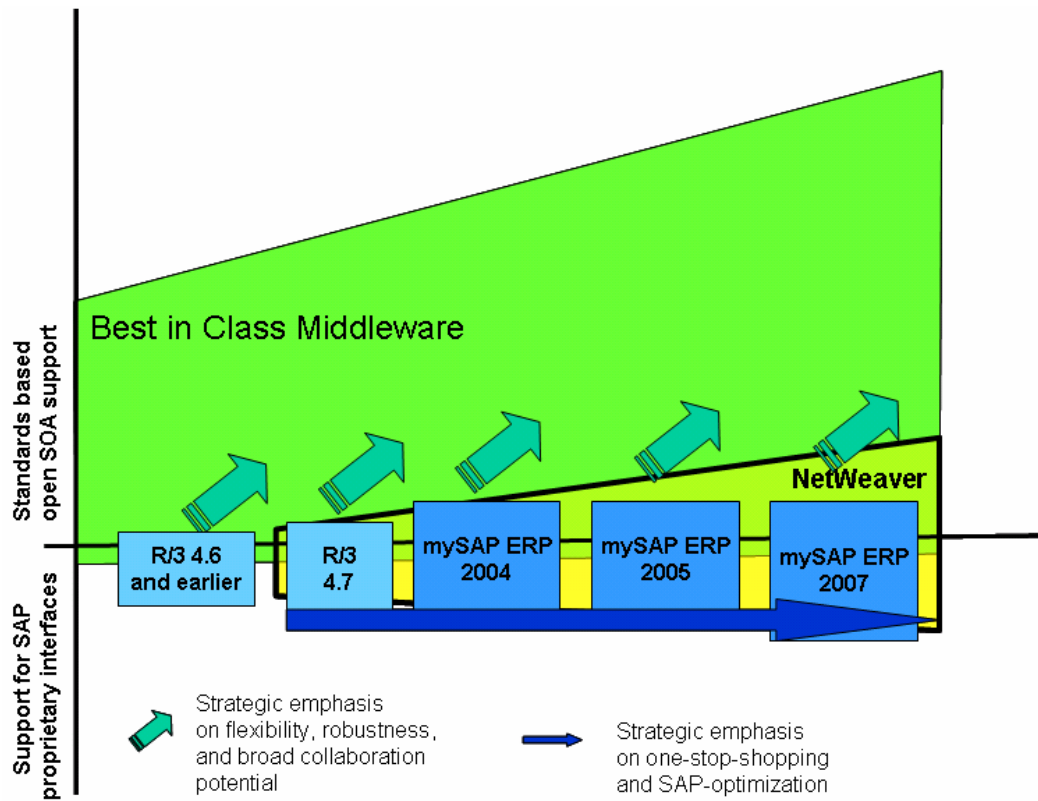
• Figure 11 Roadmap for SAP users

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SAP has to bet the company to move on and stay competitive. That is a legitimate goal and, if successful, it will yield a moderately modern set of applications – compatible enough to make the installed base migrate, modern enough to make the installed base pay again.

As the risks are formidable for both SAP and its customers, customers should keep these risks to a minimum and under steady control. It is important to be conscious of each party's agenda: SAP wants to make money by controlling a key revenue stream and increase market share whereas customers do not want to lose money and freedom.

Bottom Line

If SAP had elected to pursue a strategy like that of SSA, allowing customers to select the J2EE compliant application server and other components based on their own evaluation, matters would have been easy. Instead, SAP decided that its middleware stack had to give premium support for its own legacy applications – a decision that is probably right in the light of the huge amount of ABAP code that will be in use for many years to come.

NetWeaver Maturity Deficits

- **High availability concepts (hot standby, failover)**
- **Load levelling**
- **Easy installation features for smaller customers**
- **Groupware**
- **Natural language support**
- **Instant messaging**

• Figure 12 Some of the key areas where NetWeaver needs to improve

On the other hand, NetWeaver is still an immature offering which has many proprietary elements, a number of which are required to support the SAP ABAP legacy. SAP, while actively cooperating in the definitions of many SOA-related standards, aligns standards implementation with its business model, giving itself some protection against otherwise easy best-of-breed implementations. For the mid-term, we think that NetWeaver in a non-SAP applications environment will be of only peripheral importance.

Hence, we recommend a "horses for courses" approach which aligns customer and vendor interests best.

In environments where users share SAP's interest in the ongoing support of ABAP, NetWeaver makes a lot of sense. No other vendor can address this significant part of corporate IT better.

In environments where robustness, scalability and the power of undiminished standards compliance count, it is hard to predict if and when SAP will even be on the short list. Here, more established and far more open products like IBM's WebSphere or even BEA's

WebLogic are a much better choice. The ecosystem is huge and scalability and functionality are significantly ahead of NetWeaver.

NetWeaver does not make it easy for the less experienced user to distinguish between standards compliant interfaces and functions and those that are SAP proprietary. Only the most disciplined programmers who consciously limit themselves to the standards-compliant subset will be able to create portable solutions. The vast majority of users will be locked in.

SAP has deliberately elected to pursue a strategy that integrates support for its own application legacy with elements that are part of a more open, standards-based environment. For SAP's huge customer base, the legacy part will be by far the most important in the years to come. It has to function with the performance and precision known from its predecessor, R/3 Basis. Only SAP can deliver this, because no other vendor knows the intricacies of SAP's applications better than SAP.

NetWeaver Proprietary Elements

- **ABAP and its development environment**
- **iViews**
- **WebDynpro**
- **Java Development Infrastructure**
- **Business Server Pages, HTMLB for Web**

• Figure 13 NetWeaver has many proprietary elements

On the other hand, SAP is new to the open, standards based middleware market. This market has a different business model and SAP has demonstrated twice that learning this model is not easy. It needs to establish itself as a reliable and dependable middleware source supplying the broad market without discriminating against competitors – just like the other vendors do. For as long as SAP sees NetWeaver primarily as a vehicle to leverage the sales of its applications, SAP's profile in the middleware market will be tarnished. It is certainly problematic for ISVs to pursue long-term partnerships with a vendor that may drop or reduce support once it has decided that it is competing with the ISV. This has happened in the past (as in the cases of CAS and I^2 and others) and it may happen again.

Therefore, we recommend the obvious, namely to use NetWeaver where its logical and inevitable center of gravity lies: supporting the SAP-environment. Other vendors such as

IBM will continue to be a far better choice for addressing standards-based SOA scenarios, since: they are not constrained by the need to optimize their own set of legacy applications; their business model is pure play middleware has been successful for years and there is no learning curve to overcome, it is reality. SAP customers may also face additional challenges relying on NetWeaver as standards are vital in collaborative business scenarios and compromising on standards diminishes collaboration potential with the danger of having to sacrifice business opportunities, speed of standards implementation and quality of compliance are essential.

SOA has a huge potential, but it is not easy. Vendors and users are still on a learning curve that is evolving quickly. However, vendors with a higher level of standards compliance, a more mature business model and set of robust and proven products, burden their users less and offer a better base from which to tap the opportunities of SOA. Tying your pace of SOA implementation to the advances of SAP to move in this new world is not a prudent choice.

Table of Figures