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# HRG Assessment:

## Future-Proofing ERP and CRM: Considerations for building an adaptive infrastructure

### *Introduction*

Enterprise Resource Planning (ERP) represents one large step toward the totally integrated enterprise. Most large organizations use ERP to run their operations, from order entry through manufacturing, delivery and service, as well as Human Resource and Financial Management. Customer Relationship Management (CRM) is the next logical step, bringing a unified approach to customer care and opportunity development. Enterprise software will continue to push outward, toward eventual engagement of all constituents: customers, employees, business partners, suppliers, regulators and investors.

The problem is that enterprise applications tend to become islands within the enterprise. ERP is more like a continent: large, complex, tightly woven within its own world, but separate from the rest. CRM has similar tendencies. And then there are the many specialty applications, representing enormous development and infrastructure investment: portfolio management, phone service provisioning, patient care monitoring systems, and so on. Enterprise integration requires cutting across these application and data stovepipes, moving toward a concept of universal data accessibility.

How do we get there? The solution lies in the development of an adaptive software infrastructure, able to evolve as organizations grow and technologies change. Some refer to this as a virtualization layer, the set of services that sit between applications and systems. This paper will focus on the two most critical and interdependent functions: meeting the data requirements of the enterprise, providing applications with a unified, current view of all enterprise data; and providing the linkages between applications to efficiently move transactions and data between data requesting and service providing applications.

We begin by characterizing ERP, CRM and the data management challenges they present. Given this foundation, we will look into application integration, the role of middleware, and the evolution of data and web services standards. The enterprise covers a lot of ground. This is a bit of a mosaic, but our intent is to help bring the pieces together and offer constructive recommendations.

*An adaptive software and data infrastructure solves two big problems: it provides all applications with a unified, current view of all enterprise data; and it provides the means to interconnect processes across applications, to move transactions and operate upon centrally managed data. Building blocks include a centrally managed database architecture, a data warehouse and the tools to use it, middleware solutions that streamline application and data integration, and industry standards – XML and Web Services in particular.*

*Creating such an architecture, enterprise-wide, will be a long-term quest, not an endpoint. Organizations that move in this direction can reduce operating costs, increase sales and marketing productivity, and engage customers in completely new ways. Harvard Research Group believes that Sybase and PeopleSoft, working together in a strategic alliance, offer significant combined strengths to organizations seeking to evolve toward a totally integrated enterprise.*

## ***ERP and CRM – the need for an adaptive infrastructure***

Enterprise Resource Planning (ERP) software is the information technology version of the “mother ship”. A suite of interconnected application modules, ERP manages everything from front office sales and order administration through manufacturing, finance, human resources, and customer service. Whatever enterprise applications ERP does not control must interface to it, to access and feed core business operations.

ERP projects are large, complex, expensive, and can take two or more years to implement. System and implementation costs run in the millions of dollars, frequently in excess of \$10 million and, for large global enterprises like Owens Corning or Shell Oil, over \$100 million. Because ERP requires such a high degree of interaction between various applications, and is by definition business critical, one vendor typically provides the entire suite – most often SAP, PeopleSoft, Oracle or Baan.

Because the software is so interwoven and complex, any customization beyond standard application capabilities should be avoided if at all possible. The reason is simple: unless you get the vendor to change their product, customizations will have to be repeated with every new software release. This will increase life cycle costs substantially, extend the implementation cycle, and increase risk of quality or operational problems. More often than not, successful implementers of ERP adapted their processes to fit the software, rather than the other way around. One CEO, polled in an MIT study, advised his team “...that they could write down every change they felt they needed on this piece of paper, and we would take it to the steering committee who would reject it.”<sup>1</sup>

Some company processes just cannot be changed, making customization inevitable. Vendors have made strides toward dealing with industry operating differences, by creating specific industry versions of their suites. Still, it doesn't always work: Kellogg worked for several years with Oracle to develop a Consumer Packaged Goods version of the Oracle ERP software. The effort proved unsuccessful and the product was withdrawn from the market.<sup>2</sup>

ERP, at least as implemented to date, does not sound terribly adaptable, and that is about right. Adaptability must be built around it. This is where the adaptive infrastructure comes in: in the near term, it can provide the flexibility to integrate other functions that a given ERP solution does not address. Longer term, industry standards for application to application communication, led by XML and Web Services, may open the door to a much more flexible ERP architecture.

Will CRM follow the same tightly integrated, single vendor approach of ERP? Probably, but there appear to be more degrees of freedom. Like ERP, CRM is offered in discrete modules, and vendors work to ensure smooth linkages between them. However, ERP is fundamentally about operational integration, and so the requirement for extremely tight, reliable, “run the company” integration is paramount. CRM is more about informational integration, presenting a unified view of the customer. The bond is the underlying data. As long as all applications operate upon and update the same data, linking modules through an adaptive infrastructure is a feasible alternative to the single vendor, monolithic solution.

## ***Harnessing the value of data***

What can happen when your organization has a clear view of its data? Cisco, for example, achieved its objective of a “one day close.” Where it had previously taken fourteen days to close its books, Cisco now closes its books in hours. Moreover, it provides managers with real-time access to operating data: they can see exactly where business stands, at any time. Bouygues Telecom, a French wireless carrier, implemented a data warehouse to house and analyze information about its five million subscribers. As a result, they were able to segment their market much more finely, conducting 70 marketing campaigns per month targeting discrete audiences. Bouygues increased customer contacts by 450% and dramatically improved its average revenue per user.

In all instances, access to the right data – correct, current, and relevant – was pivotal to the achievement of very substantial gains. Data elements may be scattered, under the control of diverse applications, in diverse formats, with much of it locked into mainframe-based legacy systems. The data management challenge is to bring these together, under a common framework, while maximizing utilization of cumulative IT capital and software investments.

If we make but one recommendation here, it is this: begin the process of driving toward a unified data architecture. Take advantage of the ERP or CRM planning process – even if you are implementing just one element. Use the process to establish a comprehensive strategy for gathering, using and protecting your data.

- “Virtualize” operational data: bring it together in a centrally managed, distributed database. You don’t necessarily need to move data, but to the extent possible, one structure needs to be in charge, managing it all.
- Consider implementing an enterprise data warehouse: all enterprise data eventually belongs here, usable by data mining, planning, and reporting applications.
- Develop a complete view of the customer, understand where all of the relevant data lies, and formulate a strategy for using it – in customer care, market outreach, and opportunity management.
- Leverage standards: we are headed toward a need for universal access, where any application may need to access data from any source. Open standards will make this possible (see our discussion further on).
- Protect your data: address requirements for data protection (data replication and high availability requirements in particular), privacy, data security, and intrusion detection and prevention.

### Getting the data right

Above all, the data must be accessible to the application, complete and accurate. In order for a new ERP or CRM application to recognize data elements, such as customer address, employee payroll deductions, job codes or product prices, data needs to be transformed from the old format to the new structure. The only way to know this has been done right is to test, and retest.

Data needs to be extracted from various databases, transformed into common addressable formats, “cleansed” (gaps filled, redundancies eliminated, crosschecks done to eliminate errors), access rules defined and data structured. Specialized transformation programming can add significant cost, time and risk to a project. Look for ETL tools (Extraction, Transformation and Load) that address the nuances of the target application, potentially minimizing this need.

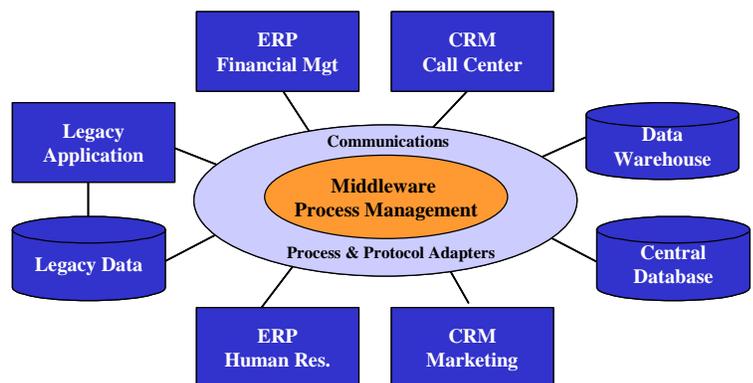
There is a tremendous premium on getting this right. Last year, for example, Agilent had to announce that it missed shipments to customers, resulting in \$105 million in lost revenue, due to a data conversion problem. Over 6,000 customer orders had to be converted to the new system format, but something went wrong in the configuration process. As a result, the application could not operate on the data. Maybe not total disaster, but close enough.<sup>3</sup>

### Interconnecting processes, allowing data to flow

Complete ERP and CRM solutions address application and process integration within the context of the vendor’s own product suite. But what about other applications, those not part of the suite? How do these interact with ERP, CRM and each other, to move transactions and process data?

Historically, IT organizations or their consultants have developed individual links between separate systems that need to communicate. These software links are tightly controlled, well tested, and highly reliable. The problem is that each new system interface represents a change to the system. Every process that uses that interface will need to be tested and validated. This takes considerable time and effort, and slows the organization’s response to change. At some point, as one adds more and more systems and interfaces, the one-to-one method breaks down. There are just too many interfaces, too much “spaghetti code” to maintain.

Figure 1. Hub and Spokes Model



This is a big problem. Maintaining the systems and infrastructure already in place consumes the lion's share of most IT budgets. Seventy to eighty per cent seems to be the norm, typically leaving less than thirty per cent for new initiatives. In belt-tightening times it can be even less. One CIO told us that he had an annual budget exceeding \$30 million per year, and of this, "less than \$4 million was for new stuff." There has to be a better way.

The answer can be found in middleware solutions. In a "*hub and spokes*" model (Figure 1), all applications connect to one another as spokes through a process-serving hub. Each connected system requires just one interface. In the case of legacy systems, no interfaces need be changed; instead, an adapter at the hub converts requests and information from the legacy application structure to that of the target structure, or preferably, to a common structure that other applications can understand. This can reduce the number of discrete application interfaces by a factor of ten or more, generating huge savings.

The same CIO mentioned above, mid-way through a CRM implementation, expects this model to reduce his total operating costs by over five per cent, effectively increasing his budget for "new stuff" by nearly 50%. Thomson Financial implemented a similar model, with a well defined application server and components middle layer, with even more pronounced effect. Thomson was able to reduce the portion of its budget dedicated to infrastructure and maintenance by half, from 80% to 40% of the IT budget. This allowed them to shift their IT focus to customer facing applications, now accounting for 60% of their budget.<sup>4</sup>

### *The power of standards – XML and Web Services*

What is that "common structure" that most applications might understand? Increasingly, the global answer is the eXtensible Markup Language, or XML. XML is a language used to define how data is represented, designed for use with the Internet and far more flexible than HTML. Its beauty is that the XML code resides with the data it defines. This means that any application that supports XML will be able to interpret the data, using the provided XML instructions

XML can be used to describe any information, from hospital x-rays to service call logs to prospect lists. By giving applications a common data language, XML will make it much, much easier for organizations to take advantage of "best of breed" applications.

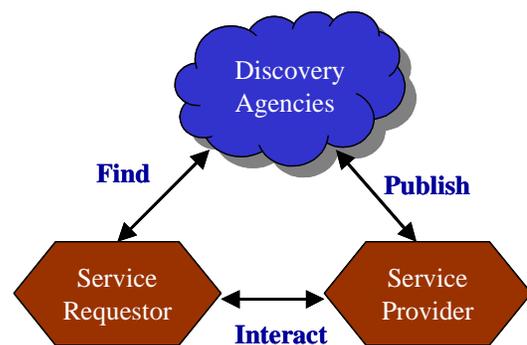
Building upon XML, Web Services pushes standards to an even higher and more promising level. A web service, loosely defined, is an application component that can be accessed over the Internet using XML and Internet protocols. Web Services standards include a schema, the Service Oriented Architecture (Figure 2), which defines how applications can be distributed across the Web, discovered and invoked (Figure 2):

- Applications are registered through Web-based "Discovery Agencies," so that other applications can find them;
- Users or applications can discover these applications, as "Service Requestors" by polling the Discovery Agency;
- The Service Requestor and Provider can then connect directly across the Web.<sup>5</sup>

The potential here is huge. Applications can reside anywhere on the Web, and be discoverable and directly accessible to any service requestor. Enterprises will most likely take advantage of these capabilities for internal uses first; external application links will evolve as market acceptance of Web Services grows.

Merrill Lynch recently announced an interesting use of XML and web services, what it calls 'X4ML' (XML for Merrill Lynch). Merrill Lynch wanted to make IBM mainframe-based (CICS) data available to clients, and needed a way to do it. Their solution was to use middleware to gather information from the IBM legacy systems, stage it centrally as XML data, and through another application, process client data requests received over the Web.

**Figure 2. Service Oriented Architecture**



Merrill Lynch is essentially offering its mainframe data as a web service, with the help of XML and middleware.<sup>6</sup>

Web Services define a broader operational framework than XML, and are considerably less mature. Consequently, while most IT professionals seem to agree about the eventual importance of Web Services, broad-based implementation will be some time off. That is not necessarily a bad thing. Industry associations are continuing to refine the standards, and vendors need time to build web services capabilities into their applications. Vendors that take best advantage of the Service Oriented Architecture will have products that integrate most easily with other products and systems, which could prove to be a major competitive advantage.

In the meantime, XML is mature and in the early stage of mass market adoption. A rational approach to web services implementation would be to:

- Commit to XML now, if you have not already, and build it into your database and application framework.
- Understand Web Services and develop a plan for internal test deployment within the next year. Do not wait, this is moving fast.
- Whatever your timetable is for deployment, accelerate it. Plan to implement web-based, customer-oriented and/or self-service applications as web services within the next year to eighteen months.
- Look into extended uses of XML. Consider, for example, XBRL (eXtensible Business Reporting Language), which addresses the presentation and interpretation of financial data. Financial information becomes a set of objects, created once and used by the various applications they feed. XBRL will significantly accelerate the flow of financial information for business reporting and analysis.

### ***Conclusions and Vendor Considerations***

Building an adaptive infrastructure is not an “all or nothing” proposition. It is something that can and should be done incrementally, one challenge at a time. This is eminently feasible and actionable today.

In summary, Harvard Research Group recommends that every enterprise consider taking the following actions:

- Bring all of your data under one roof: develop an enterprise data architecture with integrated operational databases and managed access to legacy data; consider implementing an enterprise data warehouse.
- Implement a hub-and-spokes architecture with full XML support. Start small, with one project that requires application and data connectivity between multiple internal systems, databases, and web-based clients. Prove the value and extend the model.

### ***Getting the Data Right: Legg Mason, PeopleSoft and Sybase***

Legg Mason recently implemented PeopleSoft HRMS as its new human resources and payroll management system, along with Sybase ASE for enterprise database management, and Sybase Replication Server for data replication and failover. The system is up and running, and Carol Brown, VP, Corporate Technology, is pleased: “We finished with very few problems and are in a much better environment than we were. We are very proud of what we accomplished.”

Success required transforming data structures from the former application to the new PeopleSoft structure. Legg Mason engaged consulting firm Noblestar to lead this effort.

Noblestar’s Kenny Lew explained what this entails. PeopleSoft’s application includes about 1,700 tables. Transformation means filling the new tables with data from the old structure. Table organization and data representation will differ, making this a challenging, and potentially error-prone process.

Noblestar used Sybase Convoy/DM to accelerate the extraction, transformation and loading process. Designed with PeopleSoft applications in mind, Convoy leads users through the mapping process with a user-friendly graphic user interface. Users point and click to connect old columns to the new ones. Convoy then generates a program that executes the actual data transformation.

The advantage of this sort of logical mapping is that non-programmers can do it. In this case, HR professionals, people who know the data, can drive the transformation process, reducing the likelihood of mapping errors. It also eliminates the need for special conversion programs. According to Lew, this makes for a much faster, more reliable result. He estimates that Convoy saved the cost of two full-time programmers over the 21-week project.

The Legg Mason project devoted the first six weeks to fit-gap analysis, then began the transformation process. By the end of week seven, all current data had been entered. Said Lew, “Getting this done so early in the 21-week project gave us all confidence that this would go well.”

- Get started with Web Services. They can bring flexibility to internal enterprise application integration in the near term, and offer tremendous potential for the future.
- Seek vendors with a multi-vendor, open architecture approach to enterprise integration. Look for aggressive, demonstrable support of open standards.

Harvard Research has been asked to take the vendor question one step further, and consider the value that Sybase and PeopleSoft, working together through a strategic alliance, bring to the adaptive infrastructure. The short answer is, quite a lot.

Each company offers its own distinctions, but looking at them together, two advantages jump out. The first is the combined delivery of a better customer experience, through cooperation across all aspects of product and service delivery. Sybase engineers work directly with PeopleSoft peers in product design, revision testing and troubleshooting. Specific products, such as Sybase Convoy/DM, are designed expressly to apply Sybase technology to PeopleSoft applications.

We also see this cooperation across customer facing activities, from marketing and sales to professional services delivery. Joint efforts such as these make for better products, higher quality installations, better customer communication, and ultimately, greater customer satisfaction.

The second major advantage that we see is potentially more far-reaching: PeopleSoft and Sybase bring an open, standards-based approach to data and application integration. Their combined commitment to XML, Web Services, and the deployment of applications and data across the Web brings together all the pieces necessary to build our adaptive infrastructure. They can build it today.

For example, PeopleSoft actually uses web services to integrate its own products operating across the Web, utilizing their Pure Internet Architecture. Sybase has supported XML for years, providing unique database storage and retrieval features, and offers a suite of Web Services tools and adapters as part of its Business Process Integration (BPI) Suite.

Both companies take an aggressive stance on next generation platforms and service delivery. PeopleSoft and Sybase have both taken market-leading positions in their support of Linux, and offer extensive product portfolios that address the mobile user. This adds platform and client adaptability to the mix.

Sybase is, of course, focused on data and application integration, and so offers additional capabilities for the adaptive infrastructure, such as:

- Centralization of multi-vendor, distributed databases: SybaseASE pioneered the concept of federated databases, providing central policy management and control for information contained in distributed, multi-vendor databases.
- Data replication: Sybase Replication Server provides bi-directional data replication to multiple destination points in near real-time. This suits a wide range of data distribution and high availability needs.
- Industry leading data warehouse: Adaptive Server IQ Multiplex, together with Sun, set the industry record for the world's largest verified database: 48.2TB of raw data (compressed to 22TB) in 179 billion rows.
- Data transformation tools, led by Convoy/DM, and middleware that supports data transformation on the fly.
- An extensive application integration and middleware suite of products: a full set of tools, servers and adapters, under the mantle of the BPI Suite, bring all of the pieces together necessary to implement a complete hub-and-spokes middleware solution, including full Web Services support.

Harvard Research Group believes that the PeopleSoft – Sybase approach is the right way to go: help customers develop the most flexible, adaptable infrastructure they can, while providing products that play well in a multi-vendor, open standards world. In a time of contraction and business conservatism, it is good to see such organizations take such an aggressive, market-enabling approach. This is a winning strategy, and we hope customers view them in this light.

*Harvard Research Group is an information technology market research and consulting company. The company provides highly focused market research and consulting services to vendors and users of computer hardware, software, and services. For more information please contact Harvard Research Group:*

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