TEC
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Cloud ERP
Buyer's Guide
for Manufacturing

TEC Technology
Evaluation Centers

Cloud ERP buyer's guide for Manufacturing

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Preface

Cloud Computing: Pushing Aside Myths to Pursue a Flourishing Tech Opportunity

According to a recent IDG report, surveyed enterprises predicted they will invest an average of $2.87 million (USD) in cloud computing technologies in 2016, and 25 percent of total information technology (IT) budgets will be dedicated to investments in the cloud.

With numbers like that, one would think that the case for cloud computing has been effectively made. Yet, we're finding that industry-wide acceptance still battles persistent misconceptions about the cloud's functionality, cost, and security—often assumptions where the exact opposite is in fact true.

In a recent study of *Manufacturing Business Technology* readers, we looked at the most common misconceptions around cloud computing technology and, on the flip side, examined its greatest benefits:

- **Functionality.** Things like collaboration around product design, procurement, and production mean cloud applications can offer a smoother approach to communication with key vendors and partners. Thirty-four percent of our survey respondents said they used the cloud for their customer relationship management (CRM)—a common starting point for businesses dipping a toe in the water. Additionally, disaster recovery is a huge benefit of the cloud, yet only 18 percent of *MBT* cloud users identified this as a reason they used the technology. Often, cloud computing delivers faster recovery times and multi-site availability at a fraction of the cost of conventional disaster recovery—especially when server virtualization is in play. Perhaps this is not a function that's well understood by the average manufacturing IT department.

- **Security.** Some manufacturers are moving more mission-critical assets to the cloud now that they've experimented with lower-stakes applications, but experts say there is no reason to adopt a wait-and-see approach. Even though 50 percent of our survey respondents not using the cloud say the reason is because of security, it's important to note that many of these security concerns are invalid. In fact, "The 2015 Data Breach Industry Forecast" by Experian claims that employees caused almost 60 percent of security incidents last year, further compounded by the bring-your-own-device (BYOD) policy of many companies. In reality, physical control of a server does not indicate better security, despite this persistent misconception.

- **Cost.** Cloud technology opens many doors for budget-conscious businesses, especially considering that the cloud often eliminates the need for costly in-house infrastructure. Additionally, cloud solutions are highly scalable, and can grow with your business. In fact, 46 percent of *MBT* readers who currently use the cloud said that it was *because of* economic factors that they switched from on-premise technology.

There are plenty of reasons for manufacturing businesses to consider adopting cloud technology. The great part is, it's not an all-or-nothing proposition. The important thing is that these businesses look hard at their requirements and assess whether any negative conceptions they have of cloud computing are exaggerated or outdated. For those in our survey who were using cloud solutions somewhere within their enterprise, 83 percent were either satisfied or very satisfied with their approach—a great indicator that this technology is validated and warrants more widespread adoption.

Jon Minnick, Editor
Manufacturing Business Technology

About Manufacturing Business Technology

Manufacturing Business Technology has served as a leading resource for manufacturers for the past 29 years, and is a prime information source for decision-makers in operations, information technology, automation, and the supply chain. This group of professionals is responsible for the purchase of software, IT infrastructure, automation platforms, and equipment for manufacturing enterprises. The MBT readership works in discrete and processing industries where the right technology decisions translate to success on the plant floor and beyond. For more information, visit www.MBTmag.com.

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About This Guide

The Technology Evaluation Centers (TEC) Cloud ERP Buyer's Guide for Manufacturing addresses the typical questions manufacturers have on cloud software deployment versus the on-premises and hosted alternatives, and provides a basic framework for assisting manufacturing company decision makers in their evaluation of enterprise resource planning (ERP) software solutions.

This buyer's guide is intended primarily for small and medium-sized manufacturing companies that are newcomers to the cloud ERP scene, but want to learn more about the cloud delivery option of ERP software. As the cloud entails numerous technical, functional, and financial aspects, this guide focuses on addressing basic questions regarding the initial considerations for evaluating a cloud option for ERP, a complex software system. Further considerations of cloud ERP as a viable option for your manufacturing company will require deeper investigation.

Cloud-based ERP Landscape for Manufacturing

As cloud computing is becoming the norm for organizations today, manufacturing companies are also expressing increased interest. Although most manufacturers do not see cloud-based enterprise resource planning (ERP) software systems as a viable option for their current business, they are, however, keeping an eye on the market for potential future use. Based on multiple conversations with manufacturing ERP software vendors, it appears that about 10 to 20 percent of manufacturing companies are currently deploying their ERP solutions in the cloud, or giving serious consideration to the cloud. Manufacturing businesses still express many concerns and barriers to cloud ERP, but significantly fewer than those of a few years ago, when the idea of cloud ERP was introduced. Additionally, the cloud has been developing and maturing as an industry at a high pace, offering more and more options for its customers while eliminating concerns and dispelling numerous myths about cloud computing.

Today, the vast majority of manufacturing companies have already hopped on the cloud in one way or another, and have a clearer understanding and more familiarity with cloud-based business applications, such as customer relationship management (CRM), marketing automation, human resource management (HRM), business intelligence (BI), email and office applications, and so on. And while a greater level of familiarity typically leads to fewer concerns and demystification of the cloud as a concept, still a lower percentage of manufacturing businesses, compared with businesses in other industries, wish their full-blown ERP to be delivered over the cloud.

It is particularly difficult to answer the question of how many manufacturing companies use cloud ERP. The market is highly differentiated geographically—some countries and regions have more cloud immersion than others. For instance, the U.S. market is large and probably ahead of others in terms of cloud adoption, but it is not alone. We can't directly compare cloud opportunities between some countries—e.g., China and Norway, as these markets are on opposite poles in terms of historical, cultural, and economic factors impacting cloud adoption.

Similarly, there is a big difference in the adoption of cloud software by companies of different sizes. It makes sense to talk about cloud-based ERP with small, medium, and medium-to-large businesses. But large organizations, whose own data centers are comparable in size to those

of cloud platform providers, would hardly change their on-premises approach overnight in favor of one or another cloud vendor. However, although there are exceptions, in general, large companies will eventually gravitate toward hybrid or private cloud deployment models that make sense for their particular business case.

A survey of 308 respondents from companies in all industries, including manufacturing, conducted by Technology Evaluation Centers (TEC) in December 2015 confirms the overall high interest in cloud-based ERP software. In response to the question "Has your organization considered (or is it considering) a cloud-based ERP?", 52 percent of survey participants said "Yes" (see figure 1).
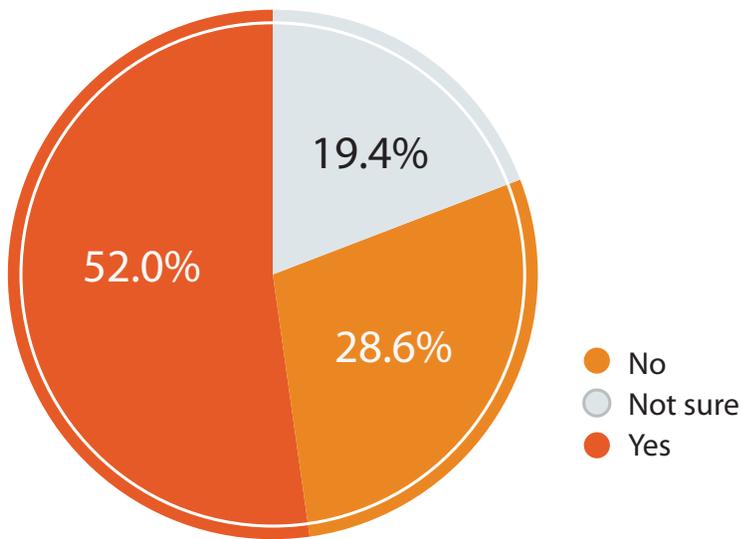
Figure 1. Percentage of organizations considering cloud-ERP software (TEC survey)

In turn, cloud-based ERP manufacturing software is increasingly becoming more advanced. While 7 to 10 years ago we could hardly place brand new cloud vendors next to their on-premises counterparts in terms of available functionality, the situation is different now. New configuration features have made it significantly easier to adjust even public cloud–based ERP software to manufacturing companies' business processes than it was before. Certainly, some packages are more flexible than others, but there is evidence for an overall trend for manufacturers to be moving toward cloud ERP arrangement and its variations. Hybrid or private cloud deployment makes it even easier for manufacturers to consider cloud ERP to run their business.

Cloud ERP 101

Like any other technology, a technology for delivering software via the Internet has greatly evolved in recent years and is rather complex. For the sake of simplicity, we will not discuss technical and other complex considerations of cloud ERP software in this guide, but will present some of the variations and options that are available for manufacturers to leverage in order to better operate their business.

There are several definitions of cloud computing, and as cloud computing continues to evolve, it is becoming increasingly difficult to define it. The basic idea of the cloud is that the technology infrastructure enables several types of computing tasks to be performed over a local area network (LAN) or a wide area network (WAN), such as the Internet.

For a formal definition, let's use the one from the National Institute of Standards and Technology (NIST): "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

Cloud as a Software Delivery Option

So, based on the definition above, NIST describes the cloud infrastructure as differing from the traditional computing model in five main characteristics:

- **Broad network access**—enables computing capabilities to be available over the network and to be accessible through a wide and common variety of client platforms (mobile phones, tablets, laptops, workstations, etc.).
- **On-demand self-service**—enables computing capabilities (storage, server time, applications, etc.) to be provided automatically from a service provider to users, without users ever having to interact with the provider.
- **Measured service**—enables both the service provider and users to monitor, control, and report resource usage.
- **Resource pooling**—serves multiple users via a multitenant model. Within this model, physical and virtual resources can be assigned and reassigned dynamically to meet consumer demand. The customer generally has no control or knowledge over the exact location and configuration of resources.

- **Rapid elasticity**—enables computing resources to be provided and released elastically and/or automatically to scale resources rapidly according to demand.

The functionality of cloud software such as ERP is technically delivered from a remote unlimited source over the network, and can be shared with other customers using the same application. Interestingly enough, the average user may not notice any difference between software that is delivered on premises and that on any type of cloud. The user is mainly interested in whether the required functionality is always available on his/her computer or other device. However, the management and information technology (IT) departments may debate the cloud versus non-cloud software delivery options from technological and financial perspectives.

Public Cloud and Hosted Solutions

The resource pooling capability of the cloud computing platform often resides in a multitenant model. Multitenancy means that a computing resource can be used or shared by more than one consumer. Resources such as storage, processing, memory, applications, and others can be shared between different consumers. These consumers can be located within the same organization, or they can be from totally different companies.

Cloud services can also be categorized based on the way they are deployed to serve the user community. A software platform infrastructure generally can be deployed in a public or private cloud, or in a hybrid mode:

- **Public cloud:** A public cloud grants general access to the same software instance to all its customers, but keeps customers' data separate. Public clouds are paid for by monthly software rental fees, enabling organizations to transfer capital expenses to operational costs. All the software maintenance tasks and upgrades are performed by the vendor. Public clouds are typically formed by organizations dedicated to selling cloud-based services only.
- **Private cloud:** This cloud infrastructure is created and deployed only within a single organization, regardless of whether it covers one or more locations. Private clouds can be managed internally by the organization, the cloud provider, or a third party. The private cloud option requires that the company assumes not only operational costs, but also capital costs.
- **Hybrid mode:** This type of deployment combines the features of both public and private clouds, and may also include elements of on-premises solutions in various combinations. Cloud platforms enable organizations to delegate tasks associated with specific security or other concerns to the private cloud or to on-site hardware and software, while allotting all public operations to the public cloud segment. In effect, this mode allows organizations to use the security and performance of their company's IT infrastructure and combine it with new functions, tools, and other opportunities available in the cloud software delivery option.

Different software delivery modes are distinguished by not only their technical characteristics but also the levels and areas of responsibility of the parties involved: the customer organization, software vendor, or third-party service provider. Table 1 provides a general scheme of how various components of software delivery can be distributed between the customer, software vendor, and/or service provider.

	On premises	Hosted	SaaS
Hardware and infrastructure	Customer	Vendor / Service provider	Vendor / Service provider
Software application	Customer	Vendor / Service provider / Customer	Vendor / Service provider
Customer data maintenance	Customer	Customer	Vendor / Service provider

Table 1. Software deployment method and areas of responsibility

This relationship is somewhat more complicated in real life. There are multiple layers of hardware, infrastructure, software, and data components involved in various different combinations of software delivery options. And for every element in the table, the assignment of responsibility really comes down to a mutual agreement between the customer, vendor, and service provider.

SaaS, PaaS, IaaS

To ensure the separation of its functional and technical components, a cloud computing platform relies on having three basic architecture layers:

- **Technology layer:** This is the first layer of the cloud platform, and it combines servers, operating systems, network devices, and so on.
- **Application layer:** This is the functional layer, and it is formed by all business applications, such as ERP, that run on the cloud computing platform.
- **Information layer:** This is the third layer, and it enables information to be available from anywhere in the cloud. It guarantees that the information will be secure, consistent, and reliable.

Each of these layers can be delivered to a customer via a cloud computing platform, providing multiple ways of consuming computing resources. These resources are delivered via three main service models. A cloud computing provider is therefore responsible for providing a wide range of computing resources included under that service umbrella. The main types of service models are as follows:

- **Infrastructure as a Service (IaaS):** Consumers are provided with computing resources such as processing, storage, and networking in order to run operating systems and applications as required. Users don't control the cloud infrastructure, but they can control the operating systems and many types of applications.
- **Platform as a Service (PaaS):** Users are provided with the ability to deploy commercial applications or applications created in-house and supported by a provider. Users have control over deployed applications but not over other infrastructure components, such as storage and processing.
- **Software as a Service (SaaS):** Users can use the software application from the provider. This application runs in a cloud computing platform over the network, and is generally available through a network interface such as a Web browser. Users don't have control of any resource other than the application itself, with control of the application consisting of a set of configuration options to personalize the application for the customer.

As every instance of a modern ERP software comprises technology, application, and information layers, such a complex software product may be delivered to customers as a single product or as a combination of layers purchased or rented depending on the requirements of the particular company. Typically, cloud ERP software as a whole product is delivered as a service on a pay-as-you-go basis. However, manufacturing businesses often use hardware from a third party via the IaaS model, and purchase their own software licences and fully control their data.

Cloud ERP Considerations by Category

A variety of cloud ERP solutions are available on the market, and manufacturers that are considering or are already in the process of selecting an ERP software system for their manufacturing business have an ample pool of solutions from which to choose. As there are dozens of software vendors that offer seemingly comparable ERP products, how do manufacturers go about choosing an ERP system that is suitable for their business? This is not an easy task, by any means.

To simplify navigating the ERP software landscape, we have classified cloud ERP software vendors according to five major factors: origin of the software, size of the customer, variety of deployment options available, vertical industry served, and technical platform used.

Software Origin

The origin of the cloud ERP software is probably the most important characteristic of the product. The software's origin reflects its range of capabilities and, often, the maturity of the product. So, here we can split cloud ERP vendors into two groups:

- Cloud ERP vendors that have emerged on the market relatively recently as cloud-only ERP products developers. Such cloud-native vendors sell strictly public cloud software; they have no history prior to their formation, although many were founded by traditional ERP companies or by previous top managers of such companies. Though they are relatively new to the market, these companies and their products have matured dramatically to become notable ERP market players. These include Plex Systems, NetSuite, Kenandy, Rootstock Software, among other vendors.
- Traditional on-premises ERP vendors that have developed newer cloud versions of their existing products or offer brand new solutions that are cloud based. This group of ERP market players is more numerous, and includes the vast majority of on-premises vendors that have recognized the cloud trend and reacted accordingly. Thus, the products in this group originate from traditional and functionally rich ERP solutions, and have accumulated a wealth of experience. Among these ERP vendors are industry leaders such as SAP, Oracle, Infor, Epicor, and many others. But while many traditional ERP solutions can now be provided over the cloud infrastructure, they are considered by cloud-only competitors and many "pure cloud" proponents to be "legacy applications."

Customer Size

The cloud delivery of massive products such as ERP blurs the classic boundaries between different types of software products and their consumers, making large systems and their functionality more affordable to smaller customers. Nevertheless, these cloud ERP products solutions can still be roughly grouped as those intended for larger organizations, those targeting medium-sized customers; and those designed primarily for smaller businesses.

Available Deployment Options

Vendors of cloud ERP solutions can be classified according to their software deployment mode, which reflects their technical capability and their readiness to accommodate the requirements of their clients. The cloud ERP companies on the market offer these three major options:

- Public cloud–only delivery and do not discuss any other options
- Public or private cloud delivery depending on the requirements of the particular customer
- Private cloud–only delivery, as these vendors are most likely traditional on-premises ERP vendors that, for some reason, cannot offer their products in the public cloud environment

Note that for many organizations, various different permutations and combinations of the above options are available—the final system configurations depend to a great extent on the mutual agreement between the parties involved.

Vertical Industry

ERP software products for manufacturing can also be classified according to the industry vertical that they serve. These products are highly specialized for specific manufacturing industries, as each industry has its own often-unique processes and compliance requirements. The vast majority of newly emerged cloud-native ERP vendors began developing their products in order to support the discrete manufacturing vertical. Other segments of manufacturing (process, engineering-to-order, etc.) were mainly occupied by software vendors that had been serving those industries for years and later developed cloud versions of their products. Thus, there are not many manufacturing cloud ERP systems that are capable of supporting multiple manufacturing industries. So companies in industries other than discrete manufacturing looking for a cloud ERP solution will most likely find that their shortlist of vertical ERP solutions coincides with that of traditional ERP vendors.

Technical Platform

The cloud platform on which the ERP application is based is another matter for consideration in the selection of cloud-based ERP software. Microsoft Azure, Salesforce.com, and Amazon Web Services are among the most popular platforms. As other packages are also developed on these platforms, companies may find it easier to integrate their ERP system with other applications on the same platform. So companies need to know which software solutions they are likely to use. This requires that companies—even small ones—develop either formal or informal IT strategies to align their vision of the future with the types of software they will use.

Recommendation

No single factor in isolation should govern your choice of ERP software. When looking to purchase an ERP solution, not only will you need to review products in depth, but it is also useful to investigate the vendors' strategies and priorities to gauge which is the best match for your company's corporate vision.

Why Is Manufacturing Behind the Cloud ERP Curve?

It is a matter of fact: manufacturing companies are slower than companies in other industries to adopt cloud-based ERP software. Practically all the manufacturing ERP software vendors and manufacturing companies TEC interacts with report this pattern of behavior. What is the rationale for their slower adoption of cloud ERP software?

A major reason for the slow cloud ERP adoption may have to do with the uniqueness and complexity of core manufacturing processes—for each and every manufacturer. Moreover, production and logistics processes are often different from one manufacturing site to another even within the same company in the same country. What's more is that similar business processes can differ across regions and countries. At the same time, public cloud software implies unified business processes and does not easily accommodate process variations and deviations. Cloud ERP vendors argue against this bias, asserting that manufacturing processes are alike overall, and can be harmonized and unified enough to be acceptable for a single-instance ERP software, which public cloud ERP essentially is. Nevertheless, the perception of the uniqueness of manufacturing business processes is still prevalent among many top managers of manufacturing companies—who ultimately make the final decision in selecting ERP software.

Another important reason why many manufacturing companies are still avoiding cloud ERP is that they have invested heavily in their own IT infrastructure, on-premises ERP, and other software—assets that cannot be easily discarded. Based on the accounting principles and standards of a specific industry or country, companies that abandon assets may have to write off non-fully depreciated assets, which negatively impacts their profit and loss (P&L) numbers. Certainly, many financial managers, company owners, and shareholders would not appreciate this.

Unlike the community of cloud proponents—which includes cloud software solution vendors, software analysts, and technical experts—the viewpoint of many manufacturing companies is that cloud delivery is just another way of deploying the same or similar massive and overwhelming software product, which ERP in fact is. The C-level management of many manufacturing companies has yet to appreciate that cloud software is a wholly different concept of computing infrastructure and software consumption that offers several benefits.

On the other hand, many manufacturing companies see cloud ERP as being very different from on-premises ERP, and they have concerns about the data ownership, privacy, and security of cloud ERP software. As a result, they are not willing to replace their on-premises ERP—even though they may not be satisfied with it. The cloud delivery model is theoretically more secure and safe for its customers, but it is not that easy for manufacturers to overcome this psychological barrier and entrust the company's entire financial, commercial, and competitive information to a third party. Additionally, there are often objective obstacles related to the ownership of sensitive information, preventing companies from handing their data over to cloud providers. For instance, manufacturers of defense and medical products are often prohibited from using software that does not reside internally. A number of countries also have legal restrictions on transferring organizations' data to other locations and legislations.

Another reason for the slow adoption of cloud ERP is that the replacement of an ERP system in manufacturing is a much more complex initiative than that in other industries. This is due to the natural complexity of the manufacturing process. Even relatively small manufacturing companies often deal with tens of thousands of production and material items, intricate internal logistics, and unique business processes, and they may generate millions of transactions on a daily basis, which require highly reliable and high-capacity Internet access. Additionally, manufacturers often operate in a low-margin environment, and have enormous pressure to reduce costs. So the management of manufacturing companies has limited room for maneuvering, and mistakes in choosing and implementing new information technologies are not well tolerated.

Although the cloud deployment model makes sense strategically for all enterprise applications, including ERP, there are always exceptions. Some businesses won't be able to adopt cloud ERP because of a variety of restrictions, such as compliance, security, etc. But even those companies might be able to employ a number of hosted and cloud technology variations.

Cloud ERP Options—Pros and Cons

While the main talking points of cloud ERP versus on-premises ERP are well known, as the cloud ERP market has matured, additional benefits have come to the forefront. Companies adopting the cloud ERP model can expect to gain benefits in terms of the following:

- cost of ownership
- data transparency and security
- system adaptability and configurability
- range of functionality features available
- up-to-date compliance with regulations
- integration with other applications

- system implementation and maintenance
- system flexibility and scalability
- Web-based system with global access
- system uptime and infrastructure

Cost of Ownership

Lower cost of ownership is still the strongest rationale of cloud-based ERP vendors. A common perception among companies is that cloud-based software is significantly less expensive in comparison with its traditional on-premises counterpart. And this is true up to certain degree but, as usual, there are nuances to consider, such as the following:

- What are the overall charges and payments?
- What are the payment schedules and exit values?
- How willing is the vendor to negotiate flexible service and payment terms?
- What promises does the vendor make with regard to service level and software availability?

In a harsh reality, the stubborn payment schedules or hidden fees of some cloud ERP vendors often negate many of the benefits of cloud delivery. These vendors may require customers to pay upfront or in large installments. They may also charge additional fees on the top of regular payments, penalize user errors or occasional data-related incidents, or have other revenue maximization measures. Although both cloud and on-premises ERP software vendors sometimes undertake such disappointing practices, large cloud ERP vendors—which have more customers with a lower average contract fee ($1,000–2,000 per year), and subsequently lower revenue share per customer—tend to be very rigid in their policies and will not accommodate unique or customized contract terms and conditions.

What public cloud ERP software really does well is that it allows diversion from capital investments to operating expenses. For some companies, this factor can be the winning argument. Fixed subscription fees (available for hosted and hybrid models and sometimes for on-premises apps), savings on ongoing upgrades, and lower licensing costs allow companies to avoid having to go through long investment approval processes, as public cloud ERP requires little to no upfront major capital investment and is associated with predictable overall spending. Cloud ERP deployment may also provide some economy on the company's own IT professionals, as it requires less IT assistance than do on-premises solutions.

However, while cloud ERP is initially less expensive, it may not be significantly less expensive over the long term. Also, the hefty price tags of many cloud vendors cause some potential customers to be less than optimistic about using their products. Additionally, the running time of the software impacts costs. Cloud ERP can be more attractive over the short term, but the

overall figures can look quite different over the long term—comparative return on investment (ROI) calculations show that, on average, a cloud ERP system becomes more expensive than its on-premises equivalent after 5 to 6 years of use.

Regardless, for both cloud and on-premises systems, the overall expenses and operating costs may be higher than originally expected. Costs are highly dependent on the practices and appetites of specific vendors. It's a good practice to investigate the total cost of ownership (TCO) and any potential hidden costs and future expenses before finalizing an ERP software selection decision.

Data Transparency and Security

Is your company really ready to outsource? It's commonplace today to see every business outsource key business functions to some degree. But how willing would your company be to committing the execution of its key business processes to other people, entrusting all its sensitive financial and commercial information to third parties, or transferring other backbone functions for the sake of reducing ERP TCO or optimizing costs? This is a fundamental question that companies considering between on-premises ERP and hybrid or public cloud–based ERP need to answer.

Companies that countenance outsourcing practices and strategies will have an easier time accepting the idea of SaaS and the cloud model of software. On the other hand, those companies that tend to safeguard all sensitive information inside their walls in order to minimize possible leakages will typically opt for on-premises ERP software.

Certainly, the presence of a third-party entity between a business and its data has the potential for creating issues that companies with on-premises ERP simply don't have. Despite written guarantees to keep data safe and restrict access to various third parties, your data nevertheless becomes accessible to people outside your company. There are no guarantees against fraud, bankruptcy of the critical software provider, or other disastrous events that may cause service termination. While on-premises ERP vendors can also fold operations for various reasons, the difference is that they don't have access to your data. In any case, on-premises ERP customers need to be more vigilant and should embrace measures for responsible data handling in order to exclude others from accessing their data—a difficult and expensive task.

On the technical side, the security concerns regarding cloud ERP solutions appear to be unfounded, as reputable cloud vendors can guarantee an even greater level of security protection than the average company can afford on its own. The anxiety that businesses

experience regarding the security of their data with cloud ERP software has more to do with a psychological discomfort with the perception that an unknown circle of people has access to the company's potentially vulnerable data. Yet there is a similar, or even greater, risk with the company's internal IT structure. However, business owners and managers of on-premises software oftentimes wrongly presume that they can control their employees better and are better able to prevent fraudulent acts or quickly mitigate their effects should they occur.

Cloud software providers can typically vouch for the security of their cloud data centers and data transferring capabilities. With the fervent development of cloud technologies, virtually no small or medium-sized manufacturing company with its own on-premises infrastructure can provide the level of data security and access control afforded by cloud ERP vendors. In reality, however, the most sensitive part of the chain resides with the end user, and is usually outside of the vendor's perpetual control. This is compounded by the fact that employees are generally allowed to use their own mobile devices for work—due to growing Bring-Your-Own-Device (BYOD) and mobile work practices—which may be infected with phishing and other malware, or somehow be tracked. Therefore, companies are forced to create and appropriately manage typically complex protection measures on their own (in fact, they have to do it regardless of their ERP software deployment choice). This need partially contradicts the statement that cloud software can easily be used with no IT staff on-site—depending on the business scale, companies using cloud ERP would still need some technical assistance from their own IT staff or a third-party service.

There are a few more points related to data ownwership and access that many potential ERP buyers aren't aware of. Companies considering using public cloud software should know that the cost and time involved in fixing data errors or inevitable human mistakes can be prohibitive; there may also be fees and time delays with getting your own data back from the vendor in the case of contract termination. Additional costs may exist for data archiving, storage, and access to the archives after a certain period of time. Such expenses need to be properly identified, considered, and factored into the final price, as they may be substantial.

Adaptability and Configurability

Manufacturers of all sizes are distinct from other businesses in how they organize their internal processes, especially those related to production management. Although they share a similar company structure, they differ in many respects. In fact, no two manufacturing companies are alike, even though they may operate and compete in the same market segment. Even different facilities of the same manufacturer often conduct their internal processes in different ways. As such, the "one-ERP-software-fits-all" policy is not easily applicable to manufacturers, without companies having to make significant changes to current business processes. But ERP solutions with a vertical focus or a focus on a certain manufacturing area would work well in a cloud deployment—e.g., an ERP system specifically designed for the food and beverage industry.

Cloud ERP vendors have been increasingly developing the configuration capabilities of their software. In fact, cloud ERP software has become much more flexible over the past few years. However, there are logical and technical limitations with providing the same generic source-code application to all customers. The software fits well with some—but not all—manufacturing businesses, and with some—but not all—operations of a specific manufacturing business.

On-premises ERP solutions typically provide more adaptability in terms of system customization and modifications according to the customer's unique requirements and practices. On the flip side, there is a potentially high cost for modifications and their subsequent maintenance—for both the vendor and the customer. Again, hybrid deployment can be an appropriate option for those manufacturing companies that would like to combine the high level of modifications associated with proprietary software with the benefits of outsourced hardware.

Regardless, when undertaking a switch to new ERP software—whether it is cloud-based, hybrid, or on-premises—manufacturers should perform an in-depth evaluation of their processes and optimize all internal business processes with the new ERP system.

Functionality Range

Greater overall depth and breadth of available functionality is still a strong competitive advantage of on-premises ERP software. The larger and more complex a business, the more complicated the software requirements it demands and, therefore, the more sophisticated the ERP system it requires. Traditional on-premises software solution providers, which have been on the corporate software market for decades, have gathered unique and extensive knowledge of their customers' businesses, and have transformed their software packages into ERP solutions. On the other hand, public cloud ERP vendors are relatively new players, and many are still in the relatively early stages of functionality development.

However, the area is rapidly changing. Some large cloud-only ERP software vendors are developing their products at an aggressive pace, rapidly supplementing them with new functions and acquiring other solutions in order to include their code in the systems. So manufacturers other than hefty Tier 1 manufacturing companies will find that public cloud–based applications provide a good level of core ERP functions, such as financial management and inventory management, for their business needs. These cloud-based ERP solutions are indeed suitable for manufacturing companies with more-than-average complexity.

Traditional on-premises ERP products are also becoming increasingly available through the cloud infrastructure, at least in terms of hosting services. These options may accommodate the needs of complex businesses. Some businesses, for example, would like to retain their complex, highly customized, and unique processes, and own the data, but they do not want to have to

deal with the hardware and technical considerations of on-premises ERP systems. A number of typically smaller vendors also offer on-premises software combined with the advantages of service-like regular payments and license leasing plans. So customers have a rich choice overall—the final option of which is a matter of mutual agreement between the vendor and the customer.

Compliance

There are numerous manufacturing business verticals that fall under strict compliance rules of a specific country or region. For example, in the Unites States alone, various privacy and data security regulations stipulate that vendors must meet specific standards, rules, and practices for their software solutions. These include the Health Insurance Portability and Accountability Act (HIPAA), the Peripheral Component Interconnect (PCI), and the Sarbanes-Oxley Act of 2012 (SOX), among others. Another example of a standard is U.S. defense industry rules on citizenship data access, stipulating strict control of all data, documents, materials, and equipment on-site (on the manufacturing site).

While cloud-based ERP solutions generally comply with such standards, customers considering moving their ERP systems and data to cloud-based ERP systems should exercise an additional level of scrutiny, as the stakes are high. They should perform rigorous research of potential compliance risks and challenges prior to making such a decision. Companies that do not meet the required regulations may face significant penalties or even lose part of their business.

In fact, companies should always perform their due diligence, regardless of the deployment option sought. Specifically, they should conduct solid preliminary research and objectively evaluate and select the ERP system that best meets their business requirements, whether it's an on-premises, hybrid, or other deployment variant of ERP software.

Integration with Other Applications

The integration of sophisticated software solutions, such as ERP for manufacturing, has always been a major pain point for manufacturing businesses that have to use two or more different systems in parallel. Integration and interfacing errors and data transfer issues are the most common and critical problems for help desks to resolve. The advent of public cloud ERP had originally exacerbated the problem, as companies had a poor understanding of how to integrate the software they did not own and the data that they did not control.

The situation today has improved considerably, as the ERP industry in general and cloud vendors in particular have gained the experience and necessary know-how to provide easier application integration. In parallel, the entire software industry has developed best practices

for product integration. Moreover, the integration of cloud ERP is often less complicated than that for on-premises ERP. However, integration is still a prominent consideration point when it comes to ERP software selection. The ideal package should provide seamless integration with all the company's existing and likely future applications, whether those are installed on-premises, are located in the cloud, or are hosted. As the possibilities are endless, each individual company needs to examine the integration capabilities of all potentially suitable solutions and before making its decision.

Implementation and Maintenance Efforts

The simplicity of software implementation and maintenance is a strong selling point for cloud ERP systems. Here are a few things to keep in mind though. First, a lion's share of the preparation and implementation work involved for a typical ERP deployment at the average manufacturing company consists of business process revision and alignment with the ERP system's logic, manufacturing technology, and master data preparation and validation processes. Additionally, much time and resources are spent on user education and training. This work has to be done regardless of the ERP deployment method, and the amount of work needed remains approximately the same for cloud, on-premises, and hosted ERP software. Business process descriptions; bills of material; engineering processes; materials lists; current inventories of all the items; and the entry, migration, and conversion of other data into the system all must be correct, valid, and current. Server challenges and internal network and other hardware arrangement work are also time- and effort-consuming, but that doesn't comprise the bulk of ERP project work. An ERP implementation project should be managed similarly overall, no matter which software deployment option is preferred.

As for ongoing maintenance of ERP, cloud software definitely requires much less effort from the customer. There is no need for ERP software and server upgrades and applying fixes, which are complex and expensive processes. This responsibility is imposed upon the ERP software vendor or its authorized partner, so the customer isn't aware of any applied software upgrades unless a significant functionality chunk has been added. At the same time, and as mentioned previously, it would be a mistake to assume that cloud ERP doesn't require companies to devote any resources to supporting the technology. The ERP system for medium-sized and larger manufacturing companies is an extremely sophisticated tool that requires customers' employees to handle the data and report bugs, to track current transactions, to analyze inventory data quality, and to execute other business analysis and data analysis functions. Finally, a corporate network and Internet connections to access cloud-based ERP should be in working order at all times. All such needs require qualified technical personnel and dedicated ERP resources to be in place.

Additionally, many manufacturers want to be able to control the update processes. This is an interesting point, as all cloud ERP providers claim continuous and often unnoticeable system upgrades and updates as an absolute and unconditional benefit of public cloud software users. However, it turns out that a significant number of manufacturing companies feel uncomfortable with permanent automatic updates, and they still want to be able to fully test, prepare, schedule, and implement newly available functions. This is because those functions may interfere with core business processes and may require re-engineering and additional training for users. In such an environment, companies may opt to turn off or simply ignore much of the already available functionality.

Flexibility and Scalability

The high level of flexibility and scalability of cloud-based software appear to be strong marketing points, and hence weapons, for cloud-based ERP vendors. A high level of scalability is obviously a strong argument in favor of SaaS ERP software. Indeed, for a medium-sized company, public cloud ERP offers a virtually unlimited number of user workplaces—it can be limited only by technical restrictions, e.g., in the case where a vendor's data centers far exceed the requirements of a medium or even large customer. Another benefit of SaaS software is that it can be scaled up exponentially within a very short time frame. As customers don't need to manage their own server capacity, if they need to increase the number of users, they need only provide them with access devices and reach an agreement with the software provider about the new number of users. Similarly, cloud-based ERP customers can easily scale down the number of users, assuming the vendor agrees (and a service level agreement [SLA] should foresee this option). In contrast, for on-premises or and hardware-hosting variants, the process of scaling up or down is much more complicated—the company typically has to carry all licenses, no matter what the optimal user load is.

Flexibility, however, requires deeper investigation. The first question to ask a vendor is what exactly vendors mean when they use the term "flexibility." If they mean the ability of the software to adapt to possible future changes to internal business processes, the business environment as a whole, or other type of changes, then flexibility reflects how easy it is to make necessary changes within the software. Within this definition, the product deployment method would be irrelevant—as flexibility touches the system's internal logic, code structure, and other software architecture specifics, and has nothing to do with deployment processes. But if vendors use the term "flexibility" to describe the ease with which they can increase or decrease the number of users, and obtain access in other countries and regions, then cloud ERP software has a natural advantage over on-premises solutions.

Web-based and Global Access

Web-based manufacturing ERP software isn't something new—the vast majority of vendors have been successfully developing and offering it for many years, regardless of deployment mode. However, delivery via a Web browser is the only option technically feasible for public cloud ERP. The average user likely doesn't care whether the software is delivered via the Web; the delivery mode depends on the preference of the particular customer. But Web-based ERP typically has a smaller footprint, and requires fewer technical parameters for user access via mobile devices. And as the mobile device usage capability is organically embedded, it allows for easier access from anywhere at anytime. Considering the exponential growth of multinational activities in the manufacturing business over recent decades, easy access to a public cloud ERP system from any device and from anywhere in the world at anytime has become a critical factor in the success of many manufacturing companies. It is indeed a notable competitive advantage of cloud ERP over traditional ERP deployment models.

The cloud isn't the only delivery method that allows for mobile enablement; however, it is obviously easier with the cloud. On-premises ERP software, even though it is Web-based, does not provide the same level of freedom as cloud-based software, and assumes certain connection limitations due to its technical nature. If required, on-premise ERP can afford remote access to its users, but that would entail a more complicated and therefore more expensive process.

Uptime and Infrastructure

The availability of cloud-based ERP software 24/7 is the responsibility of the vendor. However, it is also critically dependent on the availability of a 100% reliable Internet connection channel that has sufficient bandwidth to provide the necessary transfer speed of the data transactions. As no provider can guarantee a fully functional Internet connection all the time, a good practice for companies running cloud-based ERP is to obtain a redundant Internet connection (or multiple connections) that uses an alternative communication channel, and to use it in parallel or keep it as a mandatory backup measure—in order to provide access to vital ERP information without any interruptions.

The channel's required bandwidth also critically affects the performance of the cloud ERP system. The bandwidth's capacity should be high enough to accommodate the constantly increasing needs of the system. As the volume of ERP-generated data continues to increase at an unprecedented pace, companies that use cloud ERP should be willing to continuously improve their Internet access channels. On-premises ERP solutions may also rely on the quality of the Internet connection, but this dependency is far below 100%.

In terms of the technical infrastructure necessary for ERP system functioning, the SaaS and hosted options have fewer technical requirements than the traditional on-premises model. They are more cost-effective simply because they require significantly less hardware on-site. Regardless of the deployment choice, companies need an internal secure network and Internet access. The existence of cloud variants suggests that companies can abandon the complex and cumbersome server farm. This is an important value-add for cloud-based ERP software—that many manufacturing businesses greatly appreciate.

But what are the concerns expressed by the ERP user community regarding cloud-based ERP? If we look at TEC's survey results (multiple answers allowed per respondent), we can see that the biggest concerns with cloud-based ERP software are security, expressed by 14.9% of respondents, and performance limitations, expressed by 12.7% of respondents (see figure 2). Concerns about data ownership in the SaaS model were selected by 11.4% of respondents. A total of 33.6% of respondents expressed concerns related to a third-party intermediator between a company and its data. If we break down this percentage, we can see that 14.9% of respondents had specific concerns about security, 11.4% about data ownership, and 7.3% about unclear data location. At the same time, only 3.9% of respondents noted a general mistrust of the cloud as a deployment option.
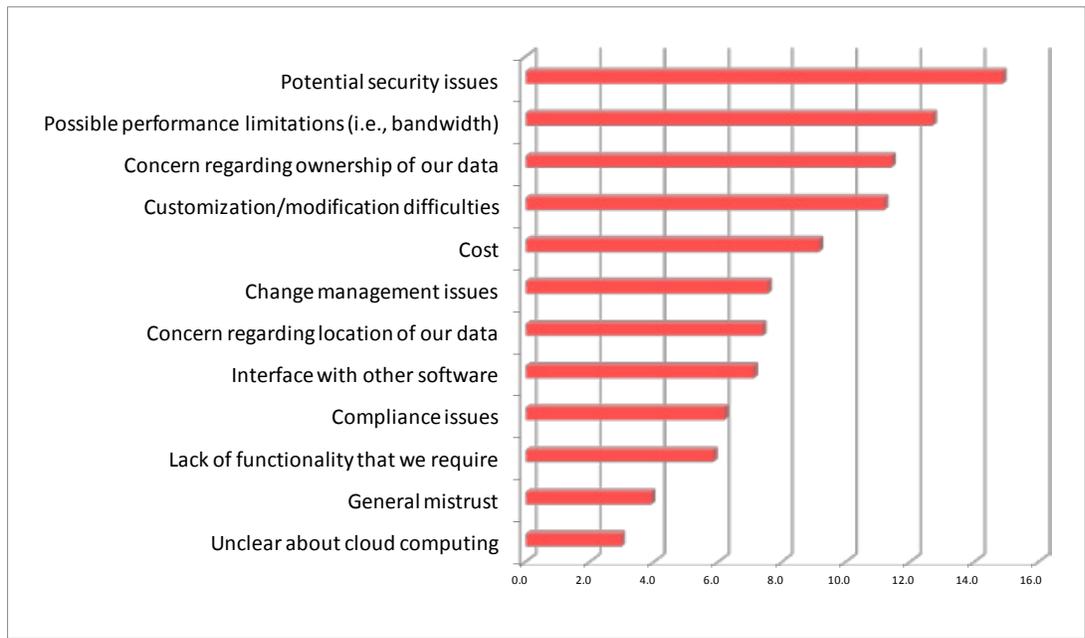
Figure 2. Percentage of respondents expressing specific concerns about cloud ERP software (TEC survey)

The most attractive qualities of cloud ERP software reside in the financial area—13.7% of respondents mentioned reduction of required IT staff, resources, and infrastructure, and 13.4% mentioned lower total cost of ownership (see figure 3). The combined percentage totals more than a quarter of all respondents (multiple answers allowed). If the "no capital investment required" reason (9.2%) is added, 36.3% of respondents believe that different aspects of the financial realm are the most important considerations in selecting cloud ERP over its on-premises competitors.
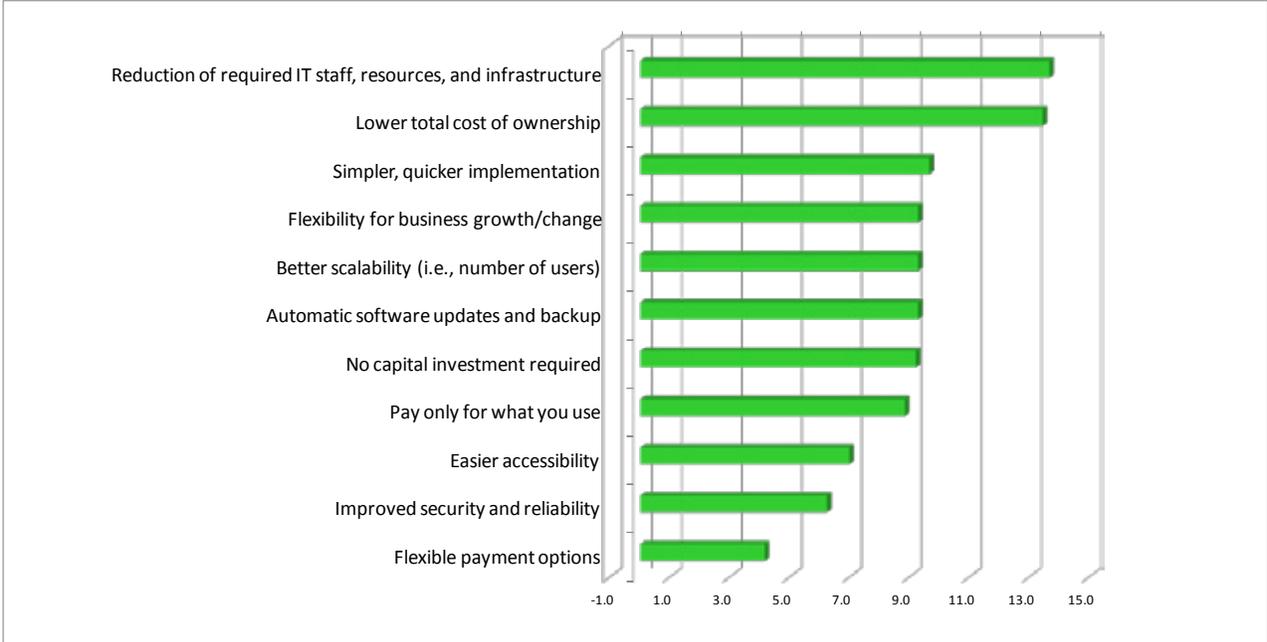
Figure 3. Percentage of respondents citing specific reasons why cloud ERP software is an attractive option (TEC survey)

When Cloud ERP Systems Appeal to Manufacturers

Manufacturing companies typically will not replace their on-premises system with a cloud-based ERP just for the sake of switching to the cloud. While there is no doubt that manufacturing companies are ultimately hopping onto the cloud, the pace of the migration differs for different types of companies and business situations. Below is a list of specific business scenarios where cloud-resided applications may be specifically recommended. In these scenarios, the embedded capabilities of cloud-based ERP systems can translate to direct benefits for manufacturers:

- Global organizations, and manufacturing companies with multiple facilities scattered across countries and regions. A two-tier ERP strategy consisting of local ERP systems combined with a global cloud-based ERP allows for easier information gathering from distant facilities and global data consolidation and analysis.
- Smaller organizations that can't afford a traditional on-premises ERP infrastructure but require a comparable level of functionality due to the complexity of their business processes.
- Businesses that prefer not to deal with the complexity of an IT infrastructure but rather need to focus on the business. This includes manufacturing companies that embrace the lean business philosophy, which considers any non-value–adding activities as a waste to be reduced and eventually eliminated.
- Newly created manufacturing businesses or new facilities that start operating from scratch, and organizations in the process of creating or reforming their manufacturing facilities and supply chains. It is significantly easier and faster to start on the cloud than it is to move there, as business processes will not be interrupted. Manufacturing companies that return their manufacturing operations from other countries (re-shoring) may also find cloud ERP to be an attractive option.
- Manufacturing companies that require enhanced mobility for their ERP users. Natively Web-based ERP software will benefit users who, for instance, may need to travel between multiple remote facilities and require ERP access from mobile or other devices.
- Manufacturing companies that use social media channels, internally or externally. Social media enablement is better and easier with cloud-based ERP software, as cloud platforms typically provide effective means for embedding social media tools.

Conclusion

Many viable deployment models may be suitable for various business situations. But there is no single answer for every company. The choice of ERP deployment option depends on dozens of unique factors specific to your company. These include strategy, industry market and vertical, type of manufactured products, geographical presence, company size, and ownership structure, among many others.

A combination of the cloud with traditional software may be an option worth serious consideration. The hybrid approach allows manufacturing companies to embrace the benefits of cloud ERP initially with non–mission-critical applications or non-transactional areas of business software. An option for those companies that prefer to keep their data inside their walls could be a private cloud deployment, which combines the scalability and flexibility of cloud ERP with the security and data ownership benefits of on-premises software.

Recommendation
Any deployment mode brings value to companies, and cloud deployment is the newest among them. Every manufacturer should conduct a thorough evaluation of the deployment model criteria based on the company's strategy, and its specific preferences and limitations—and should consider all possible ERP software arrangement options in order to select the product that best fits its business needs and future vision.

Functionality	Acumatica Acumatica Cloud ERP 5.3	Epicor Software Epicor Cloud ERP	IFS IFS Applications 9	Infor CloudSuite Industrial 9.00.30
Financials				
Accounting—general ledger (GL), accounts payable (AP), accounts receivable (AR), cash management	S	S	S	S
Fixed assets	S	S	S	S
Cost accounting	S	S	S	S
Budgeting	S	S	S	S
Project accounting	S	S	S	S
Support for lean accounting (value streams, target costing, non-standard reporting, etc.)	PS	S	S	S
Human Resources				
Personnel management, employee self-service	PS	S	S	S
Payroll/Benefits	S	S	A/S	S
Health and safety	M/C	M/C	S	S
Training management	M/C	PS	S	S
Discrete Manufacturing Management				
Production planning and scheduling	S	S	S	S
Product costing	S	S	S	S
Shop floor control	S	S	S	S
Product data management (PDM)	PS	S	S	S
Product/Item configurator	NS	S	S	S
Project-based manufacturing	NS	S	S	S
Support for lean manufacturing (pull production, Kanban, takt time, lean planning, etc.)	PS	S	S	S
Process Manufacturing Management				
Formulas, recipes, and routings	PS	PS	S	S
Process batch control and tracking	S	PS	S	S
Process manufacturing costing	S	S	S	S
Material management	S	S	S	S
Conformance reporting	PS	PS	S	S
Manufacturing execution systems (MES) integration	A/S	S	S	S
Inventory Management				
Inventory management and processing	S	S	S	S
Locations and lot control, including lot inheritance	S	S	S	S
Forecasting	A/S	S	S	S
Reservations and allocations	S	S	S	S
Purchasing Management				
Supplier profiles and ratings	S	S	S	S
Requisitions and quotations	S	S	S	S
Purchase order management	S	S	S	S
Vendor contracts and agreements	S	S	S	S
Quality and Regulatory Compliance				
Quality management	A/S	S	S	S
Regulatory compliance (e.g., FDA, EU, etc.)	PS	S	S	S
Sales Management				
Sales order management, pricing	S	S	S	S
Available-to-promise (ATP)	NS	S	S	S
Customer service and returned goods handling	S	S	S	S
Customer relationship management (CRM)	S	S	S	S
Business Platform Capabilities				
Customization and configuration capabilities	S	S	S	S
Document management	S	S	S	S
Workflow, alerts, and notifications	S	S	S	S
Business process management (BPM)	PS	S	S	S
Customizable reporting and analysis tools	S	S	S	S
Business intelligence (BI) and analytics	S	S	S	S
Barcoding and radio-frequency identification (RFID)	A/S	S	PS	S
Mobile devices support	S	S	S	S
Social collaboration tools	S	S	S	S
Audit history and trails	S	S	S	S
Integration tools	S	S	S	S
Globalization and Localization				
Multicurrency capabilities	S	S	S	S
Multicompany support	S	S	S	S
Multilanguage support	S	S	S	S
Multiple legislations support	A/S	S	S	S
Delivery Mode				
On premise	S	S	S	S
Hosted	S	S	S	S
Multitenant cloud based (public cloud)	S	S	NS	S
Single-tenant cloud based (private cloud)	S	NS	S	S

S, Fully supported out-of-the-box | NS, Not supported | PS, Partially supported out-of-the-box | A/S, Supported via a partner's add-on or solution | M/C, Supported by modification or customization.

Functionality	IQMS IQMS ERP 2015	Jakob Hatteland Computer AS RamBase	Kenandy Kenandy Cloud ERP	Microsoft AX7 Cloud version
Financials				
Accounting—general ledger (GL), accounts payable (AP), accounts receivable (AR), cash management	S	S	S	S
Fixed assets	S	S	S	S
Cost accounting	S	S	PS	M/C
Budgeting	S	S	S	S
Project accounting	PS	S	M/C	S
Support for lean accounting (value streams, target costing, non-standard reporting, etc.)	M/C	S	NS	PS
Human Resources				
Personnel management, employee self-service	S	S	NS	PS
Payroll/Benefits	S	S	NS	A/S
Health and safety	S	S	NS	S
Training management	S	S	NS	S
Discrete Manufacturing Management				
Production planning and scheduling	S	S	NS	S
Product costing	S	S	PS	S
Shop floor control	S	S	NS	S
Product data management (PDM)	S	S	NS	S
Product/Item configurator	S	S	NS	S
Project-based manufacturing	S	S	NS	S
Support for lean manufacturing (pull production, Kanban, takt time, lean planning, etc.)	S	S	NS	PS
Process Manufacturing Management				
Formulas, recipes, and routings	S	S	NS	S
Process batch control and tracking	S	S	NS	S
Process manufacturing costing	S	S	NS	S
Material management	S	S	NS	S
Conformance reporting	S	S	NS	S
Manufacturing execution systems (MES) integration	S	S	NS	S
Inventory Management				
Inventory management and processing	S	S	S	S
Locations and lot control, including lot inheritance	S	S	PS	S
Forecasting	S	S	PS	S
Reservations and allocations	S	S	PS	S
Purchasing Management				
Supplier profiles and ratings	S	S	NS	S
Requisitions and quotations	S	S	PS	S
Purchase order management	S	S	S	S
Vendor contracts and agreements	S	S	PS	PS
Quality and Regulatory Compliance				
Quality management	S	S	NS	S
Regulatory compliance (e.g., FDA, EU, etc.)	S	S	NS	S
Sales Management				
Sales order management, pricing	S	S	S	S
Available-to-promise (ATP)	S	S	PS	S
Customer service and returned goods handling	S	S	PS	S
Customer relationship management (CRM)	S	S	A/S	S
Business Platform Capabilities				
Customization and configuration capabilities	S	S	S	S
Document management	S	S	PS	S
Workflow, alerts, and notifications	S	S	A/S	S
Business process management (BPM)	S	S	NS	S
Customizable reporting and analysis tools	S	S	A/S	S
Business intelligence (BI) and analytics	S	S	PS	S
Barcoding and radio-frequency identification (RFID)	S	S	NS	PS
Mobile devices support	S	S	S	S
Social collaboration tools	NS	S	A/S	S
Audit history and trails	S	S	S	S
Integration tools	S	S	A/S	S
Globalization and Localization				
Multicurrency capabilities	S	S	PS	S
Multicompany support	PS	S	PS	S
Multilanguage support	S	S	NS	S
Multiple legislations support	S	S	PS	S
Delivery Mode				
On premise	S	S	NS	S
Hosted	S	S	NS	S
Multitenant cloud based (public cloud)	S	S	S	S
Single-tenant cloud based (private cloud)	S	S	NS	S

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Functionality	NetSuite, Inc. NetSuite One World 15.2	Oracle Oracle Applications Cloud R11	Plex Systems The Plex Manufacturing Cloud	ProcessPro Premier On-Demand 10.5
Financials				
Accounting—general ledger (GL), accounts payable (AP), accounts receivable (AR), cash management	S	S	S	S
Fixed assets	S	S	S	A/S
Cost accounting	S	S	S	S
Budgeting	S	S	S	S
Project accounting	S	S	S	S
Support for lean accounting (value streams, target costing, non-standard reporting, etc.)	A/S	NS	S	S
Human Resources				
Personnel management, employee self-service	S	S	S	A/S
Payroll/Benefits	A/S	S	A/S	A/S
Health and safety	A/S	A/S	S	A/S
Training management	A/S	S	PS	A/S
Discrete Manufacturing Management				
Production planning and scheduling	S	PS	S	S
Product costing	S	S	S	S
Shop floor control	S	M/C	S	S
Product data management (PDM)	A/S	S	S	S
Product/Item configurator	A/S	S	S	NS
Project-based manufacturing	PS	M/C	S	NS
Support for lean manufacturing (pull production, Kanban, takt time, lean planning, etc.)	S	PS	S	PS
Process Manufacturing Management				
Formulas, recipes, and routings	S	PS	PS	S
Process batch control and tracking	S	NS	PS	S
Process manufacturing costing	S	NS	PS	S
Material management	S	PS	S	S
Conformance reporting	S	M/C	S	S
Manufacturing execution systems (MES) integration	S	PS	S	S
Inventory Management				
Inventory management and processing	S	S	S	S
Locations and lot control, including lot inheritance	S	PS	S	S
Forecasting	S	S	S	S
Reservations and allocations	S	S	PS	S
Purchasing Management				
Supplier profiles and ratings	S	S	S	S
Requisitions and quotations	S	S	S	S
Purchase order management	S	S	S	S
Vendor contracts and agreements	S	S	S	S
Quality and Regulatory Compliance				
Quality management	S	PS	S	S
Regulatory compliance (e.g., FDA, EU, etc.)	M/C	M/C	S	S
Sales Management				
Sales order management, pricing	S	S	S	S
Available-to-promise (ATP)	S	S	M/C	S
Customer service and returned goods handling	S	S	S	S
Customer relationship management (CRM)	S	S	A/S	A/S
Business Platform Capabilities				
Customization and configuration capabilities	S	S	S	S
Document management	S	S	S	S
Workflow, alerts, and notifications	S	S	S	S
Business process management (BPM)	S	S	NS	S
Customizable reporting and analysis tools	S	S	S	S
Business intelligence (BI) and analytics	S	S	S	S
Barcoding and radio-frequency identification (RFID)	PS	S	S	PS
Mobile devices support	S	S	S	S
Social collaboration tools	S	S	S	NS
Audit history and trails	S	S	S	S
Integration tools	S	S	S	S
Globalization and Localization				
Multicurrency capabilities	S	S	S	S
Multicompany support	S	S	S	S
Multilanguage support	S	S	S	NS
Multiple legislations support	S	S	S	NS
Delivery Mode				
On premise	NS	NS	NS	S
Hosted	NS	NS	NS	S
Multitenant cloud based (public cloud)	S	S	S	S
Single-tenant cloud based (private cloud)	NS	S	NS	S

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Functionality	Ramco Systems Ramco Enterprise Series 5.2	Rootstock Software Rootstock Manufacturing Apps 2.1	SAP SAP Business ByDesign 1511	SAP SAP Business One 9.1
Financials				
Accounting—general ledger (GL), accounts payable (AP), accounts receivable (AR), cash management	S	S	S	S
Fixed assets	S	A/S	S	S
Cost accounting	S	S	S	S
Budgeting	S	PS	S	S
Project accounting	S	S	S	PS
Support for lean accounting (value streams, target costing, non-standard reporting, etc.)	S	S	PS	S
Human Resources				
Personnel management, employee self-service	S	A/S	S	PS
Payroll/Benefits	S	A/S	A/S	A/S
Health and safety	PS	A/S	A/S	A/S
Training management	S	A/S	A/S	A/S
Discrete Manufacturing Management				
Production planning and scheduling	S	S	S	S
Product costing	S	S	S	S
Shop floor control	S	S	S	A/S
Product data management (PDM)	S	A/S	A/S	A/S
Product/Item configurator	A/S	S	NS	A/S
Project-based manufacturing	S	S	NS	A/S
Support for lean manufacturing (pull production, Kanban, takt time, lean planning, etc.)	S	S	PS	M/C
Process Manufacturing Management				
Formulas, recipes, and routings	S	S	NS	A/S
Process batch control and tracking	S	S	PS	A/S
Process manufacturing costing	S	S	PS	A/S
Material management	S	S	S	A/S
Conformance reporting	S	M/C	S	A/S
Manufacturing execution systems (MES) integration	A/S	M/C	A/S	A/S
Inventory Management				
Inventory management and processing	S	S	S	S
Locations and lot control, including lot inheritance	S	S	S	S
Forecasting	S	S	S	S
Reservations and allocations	S	S	S	S
Purchasing Management				
Supplier profiles and ratings	S	PS	S	S
Requisitions and quotations	S	S	S	S
Purchase order management	S	S	S	S
Vendor contracts and agreements	S	S	S	S
Quality and Regulatory Compliance				
Quality management	S	A/S	S	A/S
Regulatory compliance (e.g., FDA, EU, etc.)	A/S	A/S	PS	A/S
Sales Management				
Sales order management, pricing	S	S	PS	S
Available-to-promise (ATP)	S	S	S	S
Customer service and returned goods handling	S	S	S	S
Customer relationship management (CRM)	S	A/S	S	S
Business Platform Capabilities				
Customization and configuration capabilities	S	S	S	S
Document management	A/S	S	PS	S
Workflow, alerts, and notifications	S	S	PS	S
Business process management (BPM)	A/S	A/S	PS	M/C
Customizable reporting and analysis tools	S	S	SAP	SAP
Business intelligence (BI) and analytics	S	S	S	S
Barcoding and radio-frequency identification (RFID)	A/S	S	A/S	A/S
Mobile devices support	S	S	S	S
Social collaboration tools	A/S	S	NS	M/C
Audit history and trails	S	S	S	S
Integration tools	S	A/S	S	S
Globalization and Localization				
Multicurrency capabilities	S	S	S	S
Multicompany support	S	S	S	S
Multilanguage support	M/C	A/S	S	S
Multiple legislations support	S	M/C	S	S
Delivery Mode				
On premise	S	NS	NS	S
Hosted	S	NS	NS	S
Multitenant cloud based (public cloud)	S	S	S	S
Single-tenant cloud based (private cloud)	S	NS	S	S

S, Fully supported out-of-the-box | NS, Not supported | PS, Partially supported out-of-the-box | A/S, Supported via a partner's add-on or solution | M/C, Supported by modification or customization.

Functionality	Softland ERP 7	SYSPRO SYSPRO 7.1	VAI S2K Enterprise Management Software 5.5	xTuple xTuple ERP Enterprise Edition 4.10.x
Financials				
Accounting—general ledger (GL), accounts payable (AP), accounts receivable (AR), cash management	S	S	S	S
Fixed assets	S	S	S	S
Cost accounting	S	S	S	S
Budgeting	S	S	PS	S
Project accounting	S	PS	PS	S
Support for lean accounting (value streams, target costing, non-standard reporting, etc.)	S	S	PS	NS
Human Resources				
Personnel management, employee self-service	S	A/S	A/S	M/C
Payroll/Benefits	S	A/S	A/S	A/S
Health and safety	S	A/S	A/S	A/S
Training management	PS	A/S	A/S	NS
Discrete Manufacturing Management				
Production planning and scheduling	S	S	S	S
Product costing	S	S	S	S
Shop floor control	NS	S	S	S
Product data management (PDM)	S	A/S	S	S
Product/Item configurator	S	S	S	PS
Project-based manufacturing	S	S	S	S
Support for lean manufacturing (pull production, Kanban, takt time, lean planning, etc.)	S	S	S	S
Process Manufacturing Management				
Formulas, recipes, and routings	S	S	S	S
Process batch control and tracking	S	S	S	S
Process manufacturing costing	S	S	S	S
Material management	S	S	S	S
Conformance reporting	S	S	S	PS
Manufacturing execution systems (MES) integration	S	A/S	S	M/C
Inventory Management				
Inventory management and processing	S	S	S	S
Locations and lot control, including lot inheritance	S	S	S	S
Forecasting	S	S	S	S
Reservations and allocations	S	S	S	S
Purchasing Management				
Supplier profiles and ratings	S	S	S	S
Requisitions and quotations	S	S	S	S
Purchase order management	S	S	S	S
Vendor contracts and agreements	S	A/S	S	S
Quality and Regulatory Compliance				
Quality management	PS	S	S	PS
Regulatory compliance (e.g., FDA, EU, etc.)	PS	S	S	S
Sales Management				
Sales order management, pricing	S	S	S	S
Available-to-promise (ATP)	S	S	S	S
Customer service and returned goods handling	S	S	S	S
Customer relationship management (CRM)	S	S	S	S
Business Platform Capabilities				
Customization and configuration capabilities	S	S	S	S
Document management	PS	A/S	S	S
Workflow, alerts, and notifications	S	S	S	S
Business process management (BPM)	A/S	S	S	PS
Customizable reporting and analysis tools	S	S	S	S
Business intelligence (BI) and analytics	S	S	S	PS
Barcoding and radio-frequency identification (RFID)	S	S	S	S
Mobile devices support	PS	S	S	S
Social collaboration tools	PS	A/S	S	S
Audit history and trails	S	S	S	S
Integration tools	S	S	S	S
Globalization and Localization				
Multicurrency capabilities	S	S	S	S
Multicompany support	S	S	S	S
Multilanguage support	S	S	S	S
Multiple legislations support	S	S	S	PS
Delivery Mode				
On premise	S	S	S	S
Hosted	S	S	S	S
Multitenant cloud based (public cloud)	PS	NS	NS	S
Single-tenant cloud based (private cloud)	PS	S	S	S

S, Fully supported out-of-the-box | NS, Not supported | PS, Partially supported out-of-the-box | A/S, Supported via a partner's add-on or solution | M/C, Supported by modification or customization.

TEC Resources

Articles and Reports
- 2015 ERP Snapshot: Manufacturers' Business and Technology Challenges
- Back to Basics: Cloud Computing 101

Vendor/Product Notes
- Epicor's Global ERP Software to Further Company's New Customer-centric Approach
- Infor CloudSuite—No Two Clouds Should Be Alike
- NetSuite Cloud ERP Software Gaining Traction with Larger Enterprises
- Plex Systems Aims to Take Its Manufacturing ERP Software to the Next Level
- QAD Develops Browser-based ERP Software User Experience

Related White Papers
- Combining the Flexibility of Public Cloud Apps with the Security of Private Cloud Data
- ERP Returns $7.23 for Every Dollar Spent
- Manufacturing in the Cloud
- Migrating from the Cloud
- The SaaS ERP Applications Landscape
- The State of Manufacturing Technology
- Top 10 Reasons to Buy a New ERP Now
- Moving to the Cloud: Understanding the Total Cost of Ownership

> **"** While every technology deployment comes with its own unique set of challenges, the TEC process was more efficient from the perspective of both cost and time. **"**
>
> —**Bob Lloyd, Manager, Business and Logistics Solutions, Flakeboard Ltd.**

TEC's Enterprise Software Selection Services

Technology Evaluation Centers (TEC) is the impartial advocate for the enterprise software purchaser. TEC helps companies like yours choose the enterprise software solutions that best meet their unique business requirements. Our selection services can help ensure the success of your next software selection project—quickly, impartially, and cost-effectively.

TEC's approach combines comprehensive research, industry-leading decision support technology, a proven selection methodology, and the expertise of our analysts. We can help you

- bring objectivity and transparency to the selection process,
- choose the solution that best satisfies your specific business requirements,
- reduce the cost, risk, and duration of your selection project, and
- offer rational financial justifications, and provide a clear audit trail.
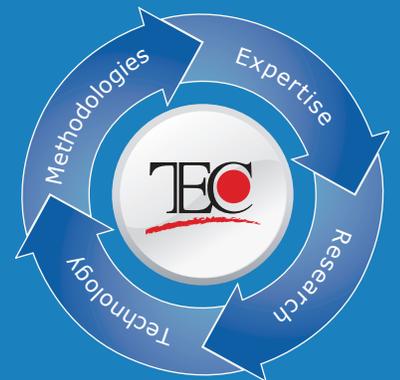
selectionservices@tec-centers.com
www.technologyevaluation.com

5 Guiding Principles for Success in Enterprise Software Selection

Software selection is among the most important decisions companies ever have to make. Technology is not just a framework for business processes but a tool that can be used to improve processes, increase competitive advantage, and better the bottom line.

Denis Rousseau, Director of Project Delivery, Selection Services, at Technology Evaluation Centers (TEC), has helped dozens of companies with their software selection projects in a career spanning more than 25 years. He has developed five guiding principles that he says can make or break success in enterprise software selection.

1. Examine your motives

The first step in a software selection process is to closely examine the rationale for acquiring a new software solution. "The very first question to ask—and make sure really gets answered—is 'why are we acquiring a new system?' Is it because of expansion at the manufacturing plant, getting rid of an old system because it no longer suits your needs, or because of a recent acquisition? If you can't make a real business case for it, the process later on won't work," says Rousseau.

This is a critical stage in software selection, because it allows for the most important foundations—clarity and commitment. A unified focus with clear objectives. When this decision is made well and communicated to the right people, you empower the process from the beginning and set off on the right foot.

2. Make it a business decision, not an IT decision

Upper management commonly misperceives software selection as the territory of the information technology (IT) department alone. But assigning the work chiefly to IT without involving all affected departments can mean the final selection decision is both uninformed and unsupported by the final users: the very worst scenario for what amounts to a very big decision.

To avoid strong resistance during software implementation, or even worse, having to make a "bad fit" software system mesh with your business processes, it's wise to realize from the outset that software selection needs to be a holistic business decision with high-level sponsorship. That means all C-level executives and implicated department managers need to be involved from the start, including in the initial decision to move ahead.

3. Deploy the right team

Rousseau has identified three key roles to fill when starting the enterprise software selection process in earnest: a *sponsor*, a *project manager*, and *internal subject matter experts*.

Every software selection project needs a sponsor. He or she should come from a level of management that has influence over all the areas of the organization that will be supported by the new system. This may be a C-level executive if the solution is to be used to standardize business processes in a smaller company. Or it may be the head of a specific division if the solution will involve limited operations. The sponsor will add visible support to the selection process, and can help to work out any higher issues that arise.

The software selection process also requires a dedicated *project manager* to oversee the process from start to finish. The project manager may come from within the organization or be brought in from the outside. He or she is responsible for ensuring the appropriate resources are identified and assigned to different phases of the project, tasks are coordinated in a logical manner, milestones are achieved as anticipated, and emerging issues are promptly addressed. Communicating the project plan and their role within the overall plan to all participants is key.

Lastly, Rousseau emphasizes that you must spend time identifying the people in your company who are s*ubject matter experts (SMEs)*—knowledgeable staff with a deep understanding of how the business works on a daily basis. He recommends casting a wide net when identifying these SMEs, as they may include senior staff with years of inside knowledge of the business as a whole, or junior employees with the vision to imagine how new software may create efficient change.

With their specific expertise in company processes, these stakeholders play a key role in the crucial requirements-gathering phase. "People who actually understand the business processes best need to be involved at the start, respected as opinion leaders, and conceived of as the future power users of the solution," says Rousseau.

4. Let your business requirements write the map

In the beginning stages, the only criteria appropriate to consider are the features and functions needed to support the relevant business processes. Everything else is secondary, including cost, cautions Rousseau. "There's no point purchasing a solution in your price range if it doesn't do what you need it to. Focus first on defining your business requirements to the exclusion of all else."

Rousseau emphasizes that the thoroughness of the requirements-mapping phase is crucial to success, and that this is where most companies fall short. "You have to establish a basis for comparison which includes critical deal-breaking items. It's the small details that can make a system entirely unsuitable," says Rousseau, recalling the case of a coffee producer who selected an accounting solution without realizing it could not handle their unique accounting-periods calendar.

Taking inventory of business processes and establishing subsequent requirements sounds simple but can be surprisingly difficult, especially from the inside. Experts in business process management and software selection can shorten the time it takes to elicit clarity from SMEs and other stakeholders, which brings us to the last of Rousseau's essential guidelines.

5. Match the sales proficiency of software vendors with software selection expertise

Much like commercial real estate or mergers and acquisitions, enterprise software selection should be understood as a unique area of specialization with its own experts, methodologies, and sets of tools. Software vendors are highly specialized sales professionals who should be met with equal proficiency on the buyer's side.

Would you allow someone without any experience to do your materials selection and purchasing for you? Probably not. "Just the same," says Rousseau, "don't leave software selection to someone without the necessary experience to be efficient and effective the first time around. Consider who is in charge of your next software selection initiative, and if they don't have extensive experience in this area, look to get them the help they need."

That help may come in several forms. Software industry analysts can shed light on what's available and trending in software application areas, and can tailor to specific industries and verticals. Tools like decision support systems are available to focus your selection process and define your business requirements. And selection consultants come armed with incomparable expertise in selection methodology, vendor tactics, and best practices for optimal outcomes.

As Rousseau concludes, "Software selection is a high-stakes gambit. I've seen costly disasters and fantastic successes. But you can significantly improve the risk-to-reward ratio if you think

"Don't leave software selection to someone without the necessary experience to be efficient and effective the first time around."

Denis Rousseau, Director of Project Delivery, Selection Services, Technology Evaluation Centers

carefully about your motives, involve the right staff, let your business requirements lead, and bring in some form of expertise to even the playing field."

" Software selection is a high-stakes gambit. But you can significantly improve the risk-to-reward ratio if you think carefully about your motives, involve the right staff, let your business requirements lead, and bring in some form of expertise to even the playing field. "

Denis Rousseau, Director of Project Delivery, Selection Services, Technology Evaluation Centers

Read more about TEC's approach to software selection and assessment.

To learn more about our enterprise software evaluation and selection services, visit the TEC website or email us.

Technology Evaluation Centers

CASEBOOK

IFS Customer Success Story

Armstrong International Reduces Inventory, Increases Efficiency by Achieving Global ERP with IFS Applications™

After going live on IFS Applications in a succession of its global divisions, Armstrong International (Armstrong) is enjoying a number of the classic benefits associated with a global instance of enterprise resource planning (ERP), including reduced inventory levels, streamlined communication, standardized processes, reduced errors, and increased productivity with fixed resources.

Armstrong went live on IFS Applications at its North American manufacturing headquarters in 2008, and soon after at another three sites in 18 months. According to Armstrong chief information officer (CIO) Kurt Armstrong, the company had been running multiple ERP systems in its various divisions, but has since united its locations in North America, Europe, China, Korea, and India on a single instance of IFS Applications.

"We had four different ERP and materials requirements planning (MRP) applications running at three locations—and they were not sharing data," Armstrong said. "We were not running as efficiently as we could. There was a desire to become a more closely tied global company. But in our Three Rivers, Michigan headquarters, we were running Infor's ERP MK. We had customized the MK solution to meet our every need. It got to the point where the solution was so customized that we could not take the next release. And we still didn't have multi-currency and multi-language features. If we wanted to go that route, we needed to do a lot of heavy lifting. Our division in Belgium, for instance, was running a product called Synchro, and our Beijing location was running SyteLine from Infor. All our locations operate as a full manufacturing facility with planners on staff, operating in make-to-order (MTO) and make-to-stock (MTS). We do a lot of intracompany transactions in our organization. We might build a subassembly in China, send it to the US in bulk and include in a final project in the US. So the ability to have all of our divisions on a single instance of ERP was compelling to us."

"In general, as a company we started to get more globalized," Armstrong director of global information technology, Joe Letizia, said. "We have a world-class video teleconferencing group, and every location is connected. We became closer as this technology brought people together real quickly across the globe. That spawned the idea that if we could accomplish this in visual communications, imagine what we could do with data."

Armstrong considered application suites from SAP, IFS, ABAS, and Infor Global Solutions. IFS was ultimately chosen for simplicity and for its ability to handle Armstrong's needs even if further diversification takes place in the future.

Classic ERP benefits

Since implementing IFS Applications as a global instance of ERP, with all plants now running IFS Applications on servers in Michigan, Armstrong has been able to meet its goal of a 10 to 15 percent reduction in inventory. Returned merchandise authorizations are also down considerably, in line with the company's percentage reduction goals.

"What these efficiencies mean is that as we continue to increase our business in size, we have done so without adding any additional order entry staff," Armstrong said. "Much of this is due to the efficiencies we are getting like those we are experiencing with intracompany orders. The time necessary to process, report on, and manage intracompany orders between our divisions has significantly gone down. It would have been double the work with our old system. This also reduces the chance for order entry errors, which in turn means fewer items are going to our bone yard or being scrapped due to an order entry error."

The company has also been able to leverage IFS Applications to improve shop floor control globally, according to Letizia.

"One of the things we did in order to strengthen the company was to form end-to-end business process teams and adopt the best ideas of each region," Letizia said. "We built them into our business flows and built IFS around them. For instance, the US has more advanced lean principles; we were able to move them to our Beijing plant. Our shop floor controls make it easier to release a shop order because we are no longer doing it in three different MRP systems. Rather we figured out the most efficient way to do it and rolled out that process with each go-live. We knew we would need an enterprise application agile enough to accommodate the practices we identified as most desirable."

Armstrong also is now in a position to better manage its parts, a key factor for a company with more than 50,000 part numbers.

Benefits

- A single, global instance of ERP, replacing several independent ERP systems
- Reduced inventory
- Improved customer communication
- Standardized business processes
- Reduced time spent managing intracompany transactions
- Corporate growth without added staff for order handling

"Now that we are standardized on one ERP system, we are searching for parts or components based on a common nomenclature, which makes things a lot easier, and we eliminate the risk of designing something we already have," Letizia said. "It allows better searches to avoid redesigning a part that is already in the system."

Armstrong stresses that all of these improvements allow for improved dealings with customers and a better customer experience, in part due to the tight integration between the IFS Sales & Marketing customer relationship management (CRM) tool and the rest of IFS Applications.

"IFS Applications has allowed us to get closer to our customers because we can tie our activities closer to the CRM information," Armstrong said. "We are more knowledgeable about our customers. Let's say an executive at one of our customer companies is wondering if we can expedite their shipment. We can pull information very quickly and break it down by product categories or on even more granular levels. We can address any concerns they might have a lot more quickly and take action accordingly. We are now providing those tools to all of our sales offices and people working on the road."

About Armstrong International, Inc.

Armstrong International, Inc. (AII), founded in 1900, is a privately held, U.S. multinational manufacturer of intelligent system solutions for steam, air, and hot water utility applications. Headquartered in Three Rivers, Michigan, it operates sales, manufacturing, and seminar facilities around the world. 'Armstrong' is a registered trademark of Armstrong International, Inc. For more information, visit www.armstronginternational.com.

About IFS

IFS is a globally recognized leader in developing and delivering business software for enterprise resource planning (ERP), enterprise asset management (EAM) and enterprise service management (ESM). IFS brings customers in targeted sectors closer to their business, helps them be more agile and enables them to profit from change. IFS is a public company (XSTO: IFS) that was founded in 1983 and currently has over 2,600 employees. IFS supports more than 2,200 customers worldwide from local offices and through partners in more than 60 countries.

About IFS Applications

Developed using open, component-based technology, IFS Applications provide extended enterprise resource planning (ERP) functionality, including customer relationship management (CRM); supply chain management (SCM); product lifecycle management (PLM); corporate performance management (CPM); enterprise asset management (EAM); and maintenance, repair, and overhaul (MRO) capabilities.

> " IFS Applications has allowed us to get closer to our customers because we can tie our activities closer to the CRM information. "
>
> Kurt Armstrong, CIO, Armstrong International Inc.

IFS Applications' service-oriented architecture (SOA) is designed to help companies collaborate with partners, suppliers, and customers. IFS Applications are a comprehensive business system for midsize and large organizations.

In addition to the processes that are supported by all business systems, such as finances, inventories, traditional manufacturing, and customer management, IFS Applications support the entire lifecycle of products from construction to maintenance and aftermarket services.

Considerations for Selecting Cloud-based Software Systems for Your Enterprise

Selecting ERP for Software Plus Services

By Rick Veague, Chief Technology Officer, IFS North America

Cloud computing is one of the most heavily written and talked about topics in information technology (IT) today. Cloud computing comes in many different forms, including software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS). The differences between these models are often misunderstood, and in some cases used interchangeably. Regardless of the terminology, they all refer to the remote provisioning of software applications over a (typically wide area) network, usually with some form of "on demand" or "pay as you go" compute model.

Using modern, highly scalable, highly virtualized servers together with specialized IT services, cloud computing can reduce the total ownership and management cost of application software. But with the shift to cloud computing can come unintended consequences, such as the level of control the end customer has over the application software (upgrade timing, configuration, and customization), and importantly, the degree to which cloud-based software applications can be integrated with other applications, either in the cloud or deployed on premises.

Software plus services, the ability to integrate or "mash up" cloud-based applications with on-premises applications, will likely become more and more prevalent in instances of enterprise resources planning (ERP), enterprise asset management (EAM), and other forms of enterprise software. In this white paper, we will explore the reasons for this, and some of the necessary technological underpinnings that an enterprise software product must include in order to facilitate software plus services.

Cloud computing models for enterprise applications

Cloud computing generally refers to the use of a common and shared pool of computing resources made available as a service to the company using them. The benefits for the users are that they don't need to have knowledge of, expertise in, or control over the technology infrastructure "in the cloud" that supports them. Instead of purchasing, installing, and operating the infrastructure themselves, it is provided by someone else and they just use it. For applications with a load that varies a lot over time, another benefit is that with cloud computing it is possible to temporarily assign more resources to the application.

In the area of cloud computing there are different levels of service provided:

- **Infrastructure as a Service (IaaS)**—the cloud provides "only" virtual hardware, on which end customers can install and run any application they like. Responsibility for installation, configuration, and maintenance of the applications typically remain with the end customer. With IaaS, the end customer usually retains control over the application software, but may or may not be granted access to integrate on-premises applications with cloud applications due to security and networking restrictions.

- **Platform as a Service (PaaS)**—the cloud provides a richer platform for applications, typically including operating system, database, web servers, etc. On top of these platform services, a number of different applications can be run. Responsibility for the installation, configuration, and maintenance of the application software is often provided by the application provider or third party, which can further reduce cost. Like IaaS, with PaaS the end customer usually retains control over the application software, but may or may not be granted access to integrate on-premises applications with cloud applications due to security and networking restrictions.

- **Software as a Service (SaaS)**—the cloud provides one or more ready-to-use applications. Applications will typically be multi-tenant, meaning that multiple users are running in the same installation of the application, using security controls to prevent sharing data with each other. Despite security controls, end customers with highly proprietary or restricted data may find a multi-tenant solution unacceptable. Furthermore, since all customers run the same application, control over the application software is typically retained by the software provider. This may reduce or eliminate the ability for end customers to configure the software in unique ways, customize the software to their specific needs, control when the software is updated, or integrate the SaaS solution with existing on-premises (or even other cloud-based) applications.

For enterprise applications, IaaS models provide some cost savings over traditional deployment models, mostly by leveraging shared server costs. SaaS models are great for some types of applications where end customer control, or the need to integrate, is not a significant concern. PaaS models can offer a good balance between lowering overall ownership and application management costs, while leaving the end customer in control of the solution.

Cloud computing is also discussed in terms of how wide an audience it targets, or how many different applications (or types of applications) are offered by the cloud provider:

- **A public cloud** describes cloud computing in the broadest sense, where computing resources are dynamically provided in a self-service fashion to anyone who is willing to pay. Use of public cloud is typically charged by incremental usage of central processing unit (CPU), network, and storage resources.
- **A private cloud** describes a cloud-based deployment model, but where access is more tightly controlled. Private cloud solutions can deliver the benefits of cloud computing while mitigating some of the pitfalls of public computing by capitalizing on security, corporate governance, and reliability concerns.

Public cloud-based deployment models are a great solution for "commodity" solutions, but private cloud solutions are generally preferred for enterprise applications and address concerns about access controls, security, and service level agreements (SLAs).

Software plus services

While private cloud and PaaS may allay some fears about the security and control of hosting proprietary financial and product data and applications "in the cloud," there is often a need to integrate those solutions with existing on-premises applications, or other private or public cloud applications. Software plus services is a great way to integrate cloud to cloud, or cloud to on-premises, applications.

Software plus services in essence combines core enterprise software like ERP or EAM hosted on-site or in a private cloud, with complementary data sources and functionality delivered as a service over the Internet. This can eliminate concerns about the security, maturity, and reliability of the solution and ownership of the data. Furthermore, it allows companies with an existing, perfectly functional on-premise enterprise application to evolve and expand that software instance by integrating functionality and data sources available in the cloud.

"Software plus services in essence combines core enterprise software like ERP or EAM hosted on-site or in a private cloud, with complementary data sources and functionality delivered as a service over the Internet."

Rick Veague,
Chief Technology Officer,
IFS North America

So even as certain segments of the market have concerns and face barriers to some cloud models like multi-tenant software as a service, we are seeing interest in leveraging services over the cloud in ways that do not force a company onto a shared multi-tenant configuration for core functionality or potentially expose proprietary data. An excellent alternative is software plus services, where you have on-premises or private cloud-based ERP or EAM solutions complemented by additional functionality delivered as a service in an integrated manner.

Not new, but developing

Software plus services is not entirely new. Enterprise software vendors have been offering some relatively simple functionality as software plus services for years.

As tax codes change, for instance, an application may reference new taxing authority tables located on a remote server. That information would be available as a service that the on-premise solution could access. The application would ask certain questions of this service and the service would provide the necessary information. This eliminates the hassle and cost of updating that data within the on-premise solution each time there are tax code changes. Instead, the service provider takes care of that for you so you always get the latest information. These web services are a simple form of software plus services.

But today, the true potential of software plus services is now being realized. As we look to the current state-of-the-art software plus services offerings, we find they are very successful ways of delivering functionality where there are real impediments to an on-premise solution.

Mapping integration is an example of something that is not often practical with an on-premise solution. It is not feasible for a private organization to include an entire geospatial mapping system such as Bing Maps in their own on-premise equipment. Fortunately, there is no real need to do that. You can buy access to that data, set it up as a web service, and integrate it with an enterprise application. If, for example, I want to see where inventory is or where service orders are, with real-time traffic information, this can be accomplished. I can then drive new efficiencies to service technicians and others traveling between different locations and make better decisions about resource allocation. I can generate work orders in my on-premise solution, but I want to see those work orders displayed geospatially with traffic coordinates, and that data is delivered as a service.

A selection criterion

As the market becomes more aware of the practical and useful applications for software plus services, the ability of ERP and EAM products to deliver functionality in this way will become a key selection criterion. Considering the ability of enterprise software to integrate with cloud-based services is one way to ensure that a given product will continue to meet your needs now and into the future. Certainly, it is important to make sure that an enterprise software product can be easily expanded and reconfigured so it can handle the various anticipated and perhaps unanticipated changes your business could go through during a period of 10 years or more. But some resources to support those changes will come not in a single solution, but by integrating multiple cloud-based services with the application. So ensuring that an enterprise software product can support software plus services is central to "future-proofing" your application environment and your business.

As economics drive the equation, there are services that can deliver more value more cost-effectively than would be possible by augmenting the on-site application. So not only does software plus services enhance enterprise agility, it keeps that total cost of agility lower than would otherwise be the case. Those embarking on a selection process will want to ask about a product's ability to combine proprietary data from an ERP or EAM application with commercially available data and functionality available from a wide range of sources and through a wide range of technologies.

IFS launched a number of initiatives in this area, including an integration with maps made possible through an agreement with Microsoft. IFS work order management is now integrated with Bing Maps in order to allow more intelligent resource allocation and decision making. IFS has also recently acquired 360 Scheduling, which adds to the mapping capabilities of those of the world's leading provider of mobile workforce scheduling and optimization software. That means we can take those same work orders and route them through 360 Scheduling to determine, based on a number of variables including SLAs, distance, and traffic loading, which of those tasks ought to be completed in an optimal order.

Key concepts

When selecting an enterprise software application, it is important to consider the following:

Deployment models offered

Does the application offer a deployment model that meets current and future requirements? Is a cloud-based deployment model offered, and if so, does it address cost, security, and control concerns? Can it be cost-effectively integrated with existing on-premises or other cloud-based applications? Or if cloud is not right for your company, is an on-premise deployment model offered, and can it be integrated with other cloud-based solutions? Is the application managed (shifting and/or reducing operational and maintenance costs)? If not, does your company have (or want to have) the in-house expertise to do so?

Service-oriented architecture

Integrating cloud-based applications using software plus services requires a modern enterprise application with an SOA that allows for common XML integration strategies. An application built using SOA offers a structured and agile approach to building collaborative solutions.

An agile user experience

An agile and configurable user experience allows one to "mash up" or combine applications and services, either on-premises or in the cloud, and then present that combined view in a way that makes sense to the end user. Taking our earlier example of integrating mapping, if you cannot present data from the mapping application together with data from your on-premise application, it is difficult to realize much value.

Conclusion

The central role the Internet plays in modern business makes a number of technologies and data resources available to companies in an enterprise software selection process. Data can be accessed from anywhere in the world, but the specific role of the Internet in enterprise applications will need to depend on the business model, degree of complexity, and risk management concerns of a specific business.

Cloud computing offers the possibility of reducing the deployment and operation costs associated with enterprise applications, but often comes with restrictions that make it less appealing. Platform as a service deployment models using private clouds may mitigate many of those concerns, allowing you to realize the benefits of a cloud-based deployment without the penalties.

That is what makes software plus services so appealing. It allows core applications like ERP or EAM to be deployed on-premise or in the cloud in a secure and reliable way, yet keeps proprietary data and core functionality under direct control so that it can freely and fluidly be made to conform to changing business needs. In the meantime, a wide spectrum of complementary services can be accessed over the Internet and integrated with those enterprise applications. In enterprise software selection processes, it will be important for executives to consider the readiness of specific software products for software plus services and the availability or roadmap for packaged integrations with key web services.

About the Author

Rick Veague is chief technology officer with IFS North America, and is based in the Itasca, Ill. headquarters. In this role, Veague provides direction for IFS' use of service-oriented architecture (SOA) and works with IFS' leading customers to leverage SOA to provide state-of-the-art ERP.

About IFS

IFS is a globally recognized leader in developing and delivering business software for enterprise resource planning (ERP), enterprise asset management (EAM), and enterprise service management (ESM). IFS brings customers in targeted sectors closer to their business, helps them be more agile and enables them to profit from change. IFS is a public company (XSTO: IFS) that was founded in 1983 and currently has over 2,600 employees. IFS supports more than 2,200 customers worldwide from local offices and through partners in more than 60 countries.

IQMS Customer Success Story

Finding a Cloud ERP Solution Developed for Manufacturing

The challenge

Like many manufacturers, a medical device company in California relied on Peachtree and Excel to run its business for years. However, the team struggled daily with duplicate and error-prone data entry, inaccurate inventory, and shipping and billing errors. In order to manage its growth and continue its high level of customer service, the business decided that it was time to implement a full manufacturing enterprise resource planning (ERP) system.

The ideal solution would be an integrated system that provided the functionality the company needed to achieve its business goals, including material and production planning visibility, up-to-the-minute production status, inventory and lot tracking, and shipping management. Since the business had limited internal information technology (IT) resources, the solution also had to be available in the cloud.

Selecting a cloud solution with manufacturing fit and functionality

Applying due diligence, the company evaluated four popular ERP vendors for their fit, function, and flexible deployment options, ultimately selecting IQMS as an obvious fit for its business. Significantly, IQMS was built for manufacturing. By contrast, the other solutions evaluated were accounting systems with manufacturing functionality added on, so they lacked the cohesive interconnectivity of business and manufacturing.

According to Frank Scavo, president of Southern California management consulting firm Strativa, "The biggest obstacle in moving to cloud ERP is that some of the most popular cloud systems do not have the functionality of the long-standing on-premises ERP vendors, especially when you get into specific industries."

> " With IQMS, the cloud application includes all the capabilities of the on-premises solution. "

With IQMS, the cloud application includes all the capabilities of the on-premises solution. Therefore, the medical device company has not needed to compromise on functionality even as the cloud deployment has given them the IT benefits and savings they were seeking.

Moreover, IQMS offers key manufacturing and account functionality that supports the firm's business requirements and helps to maintain its high level of customer service. Features such as drag-and-drop scheduling make scheduling plant floor resources simple, accurate, and efficient, allowing back-to-back manufacturing of like products and minimizing changeover time. Warning notices alert production staff to exceptions, quality issues, and underperforming equipment. Meanwhile, shipping documents and instructions can be created and sent electronically.

Benefits of the cloud

For this medical device company, as well as many other manufacturing companies, deploying IQMS in the cloud has provided several benefits.

Reducing IT resources

This manufacturing company neither had nor wanted a large IT department. The cloud solution allows its IT-related activities and expenses to be off-loaded to its service provider and Amazon Web Services. The business knows its system will be in a secure, reliable environment. In addition to IQMS ERP, the firm is moving other elements of its software to the cloud to gain similar benefits.

Backups and software updates

With a cloud deployment, backups and software updates are taken care of without the medical device company having to be directly involved.

"Many companies look at cloud ERP as a way to get into a new system without a large upfront capital investment. They also look at cloud as a way to avoid having to maintain in-house IT infrastructure to support the system," Scavo observes. "Although these benefits are certainly important, I think there is an even greater benefit in having the vendor maintain the system for future versions and upgrades. I've seen too many cases where companies are running ERP systems that are five, ten, or even more years behind the current version. If a cloud ERP system is truly a cloud system, it means that you should never be out of date."

" With a cloud deployment, backups and software updates are taken care of without the medical device company having to be directly involved. "

The story of this medical device company's choice to move to a cloud-based IQMS ERP deployment is not uncommon. For many manufacturers, the IQMS cloud solution allows them to gain the benefits of an advanced manufacturing system without the additional IT infrastructure.

Recently an electronics manufacturer in Texas was looking for an ERP solution. The company didn't have an IT department and "didn't want any IT." But with the IQMS cloud solution available at multiple locations, the business now has the manufacturing functionality it needs, as well as the redundancy and enterprise-class security that a data center provides—without an IT department.

There is no one right deployment option that fits all manufacturing companies. But with an ERP system that offers flexible deployment options and full functionality, manufacturers can have a solution offering the power to control costs, meet customer demands, and ensure optimized use of resources throughout the enterprise.

About IQMS

IQMS uniquely combines ERP and manufacturing execution system (MES) functionality to give manufacturers a comprehensive end-to-end suite for running the business, backed by the real-time performance and scalability that companies demand. Developed specifically for mid-market repetitive, discrete, and batch process manufacturers, IQMS provides robust capabilities for addressing strict customer and regulatory certification and compliance. IQMS achieves this by delivering traditional ERP functionality for accounting, sales orders, material requirements, inventory, and purchasing, plus extended native features for CRM, human resources, production scheduling, shop floor control, warehouse, and quality modules. With offices across North America, Europe, and Asia, IQMS serves manufacturers around the world. For more information, please visit www.iqms.com.

IQMS
Manufacturing ERP

Choice Is the New Cloud

By Steve Bieszczat, Chief Marketing Officer, IQMS

No single enterprise resource planning (ERP) deployment method is right for every manufacturer. Your business may have strategies and needs that are not well matched to a traditional on-premise deployment or a strictly defined software-as-a-service (SaaS) deployment. The right answer often lies between these two options. The best answer is having a broad choice of deployment options and being able to pick the solution that is best for your business.

For context, here are high-level definitions of the major deployment options:

- **On-premise:** Perpetually licensed, traditional software, deployed on the native hardware and network of the business.
- **Hosted:** Perpetually licensed, traditional software, deployed in a third-party data center.
- **Managed Cloud:** Traditional software licensed on a subscription basis, deployed in a virtual environment in a data center, with managed services.
- **SaaS:** Software which is licensed to multiple tenants on a subscription basis and is centrally hosted and managed by the SaaS provider.

At a level of detail below these high-level definitions, there are many more differences that fully define a deployment model:

Software Deployment Considerations Grid				
Factors to Consider	**On-Premise**	**Hosted**	**Managed Cloud**	**SaaS**
SW License Fees	Paid up front	Paid up front	Paid monthly/periodically	Paid monthly/periodically
Purchase Agreement	Perpetual license	Perpetual license	Subscription for defined term	Subscription for defined term
Hardware Location	Customer determined	Customer defined datacenter	Vendor defined datacenter	Vendor defined datacenter
System Hardware	Provided by customer	Rented from data center	Included in subscription fees	Included in subscription fees
Implementation & Training	Paid as incurred	Paid as incurred	Paid as incurred	Paid as incurred
Power, Network & Environment	Provided by customer	Provided by the data center	Included in subscription fees	Included in subscription fees
SW Maintenance & Support	Paid periodically	Paid periodically	Included in subscription fees	Included in subscription fees
Backup & Redundancy	Provided by the customer	Provided by the data center	Included in subscription fees	Included in subscription fees
Operating Environment	Directly installed on the HW	Directly installed on the HW	Virtual machines	Multi-tenant
Software Fit and Function	Typically complete and mature	Typically complete and mature	Typically complete and mature	Typically less complete functionality
Customization	Generally available	Generally available	Generally available	Not generally available
System Administration	Performed by the customer	Performed by the customer	Performed by the vendor	Performed by the vendor
Software Updates	Performed by the customer	Performed by the customer	Performed at the request of the customer	Automatically performed by vendor
Hardware Refresh Requirements	5-10 years	Provided by the data center	Included in the monthly fees	Included in the monthly fees
Data Access	Controlled by the customer	Controlled by the customer	Controlled by the customer	Provided by vendor
Direct Cost of Ownership	Highest initial cost / Lowest long term costs	Slightly lower initial costs, significant savings in soft costs and hardware refresh costs. Mid-point long term cost of ownership	Lowest initial cost / Highest long term cost of ownership	Lowest initial cost / Highest long term cost of ownership
Ability to go off service	Yes	Yes	No	No
Chief Benefit	Lowest long term cost	Lower IT soft costs & HW cost	No IT foot print and lower soft costs	No IT foot print and lower soft costs
Chief Concern	IT soft costs, infrastructure, HW	IT soft costs	Long term cost of ownership	Long term cost of ownership

Cost factors

Cost reduction and innovation are widely mentioned benefits of cloud and SaaS deployments. The cost reduction in cloud and SaaS deployments comes from reducing the information technology (IT) footprint within the business by eliminating system administration staff, hardware, networking, backups, and redundant utilities costs. Outsourcing these ERP soft costs is a key benefit of these deployments.

However, be aware that the most common cloud and SaaS pricing model is to recoup a typical five-year cost of an on-premise deployment in 36 months and then to keep charging that monthly fee for as long as you are using the software. Direct, out-of-pocket cloud deployment expenses will cost approximately 80% more over 10 years than an equivalent on-premise deployment.

That difference may very well be worth it if your indirect or soft cost savings offset the increased direct costs of a cloud-based solution. Soft costs include system administration personnel, hardware, networking, and redundant utilities. The thing to be aware of here is your other internally based information technologies. You still will have a network, printers, email, desktops, and probably other on-premise software. How much can you really reduce the soft costs by switching one application, albeit a major application, to the cloud? The predicted cost savings may not add up if your business continues to retain a significant IT footprint for other reasons.

When calculating the total potential savings of the cloud, consider the IT staff that you will need to keep on hand to support your desktop applications, other business software, and infrastructure.

Other financial benefits of SaaS and cloud models are just as real, but are perhaps a little less universal. For instance, a newer company doesn't have the cash upfront to buy perpetual licenses, or a domestic subsidiary of an overseas firm can't make capital investments but can spend local operating cash. Growing small businesses that are graduating from QuickBooks and spreadsheets often will prefer a cloud or SaaS model because they don't have an IT team and don't plan on building one.

The innovation factor

Cloud and SaaS providers often promote increased innovation as a benefit of these deployment options. For example, we see the claims that company X was able to reduce production costs by 33% using a cloud production management system. But the specific advantages of a cloud or SaaS deployment versus a hosted or on-premise deployment are hard to validate. The "cloudiness" of the deployment may have less to do with the deployment model than a renewed or concerted effort to run the business better on modern applications that are better designed and a better fit for the needs of the company than the systems that were used in the past.

Another key factor to consider in the area of innovation is the fit and functionality of the product. It is broadly true today that the more mature products deployed in on-premise, hosted, or cloud formats have greater functionality than more recently developed pure SaaS products. It takes years to develop full ERP functionality for manufacturing operations. And to be truly a fit for manufacturing, an ERP product needs to be wholly focused on manufacturing needs.

Software upgrades

Automatic software upgrades, typical of the pure SaaS model, need to be evaluated by many companies. Multitenancy allows SaaS vendors to deploy and operate one large instance of their product across extensive hardware and customers. This benefit, in turn, allows them to upgrade software for hundreds and thousands of companies in one fell swoop. This a great benefit.

Managed cloud deployments typically feature rich single-tenant applications run in a virtual environment and support selective update protocols. Some machines are updated, and some machines are left at the old revision level. Why is this a benefit? There are two reasons: 1) while most new features and changes respect system flags and do not impact users, some do; and 2) there are many businesses that have to certify their software and then periodically prove that it remains unchanged and therefore still certified. The easiest way to do that? Certify your software, and then freeze it. That may sound horrific to anybody in Silicon Valley, but it is a real fact of life. Many businesses cannot have their backbone ERP systems undergoing frequent changes, and these organizations will freeze their software for years at a time.

> " Managed cloud deployments typically feature rich single-tenant applications run in a virtual environment and support selective update protocols. "
>
> Steve Bieszczat,
> Chief Marketing Officer, IQMS

Multitenancy and virtualization

As mentioned earlier, multitenancy allows SaaS vendors to effectively deploy and operate one large instance of their product across customers while wholly isolating individually customer configuration and information from each other.

Managed cloud deployments typically feature rich single-tenant applications running in a virtualized environment that are just as scalable and secure. With today's managed virtual environments, it is really hard to tell a multitenant system from a virtualized system. Therefore, for many businesses, a managed cloud deployment of an application is just as effective for broad application deployment and scalability across highly optimized and utilized hardware as the SaaS multitenant model.

Customization

Customization is not unusual. There is no doubt that a good extensibility tool kit, great business intelligence (BI), and report writers are part and parcel of a modern enterprise software system. However, there are situations where custom code needs to touch the database, the application layer, and the user interface with real integrated business logic to meet a unique and important business need. For small businesses, customization may never come into play, whereas medium-size businesses will probably want some customization. And for a large business, customization is typical. It is hard to find a large enterprise that doesn't have custom code running on a backbone application. Some customization is hard to avoid among many medium and large enterprises.

Most ERP vendors do offer customization. Some provide customized code as a mainstream part of their business model; others do so more reluctantly. They build the custom code and either release it to the base as part of the product or flag it and only release it to select customers.

It is important to know if the customization you request is part of the main code tree or a branch. Customization done on unique code branches is what leads to costly and difficult software upgrades and in the worst case orphaned implementations.

An early tenant of pure SaaS was "no custom code." This is no longer strictly the case, but if custom code is on your must-have list, then on-premise, hosted, or managed cloud deployments are probably going to better suit your requirements.

Considering the tradeoffs

As you evaluate enterprise software vendors, look for those that offer deployment choices. The following questions can help you to determine what deployment attributes are important to your business:

- How stable is the vendor? Vendor stability is very important in all ERP selections, and it is everything in cloud and SaaS deployments.
- Is the solution available through perpetual licensing and/or term (subscription) licensing? How long do you expect to run the product: 5, 10, 15 years? This plays strongly into the cost of ownership.
- Can the software, hardware, networking, and redundancy infrastructure be hosted offsite?
- Are managed services available? Do I want or need managed services?
- Can the software be run in a virtual environment to take advantage of shared resources and optimize hardware capacity?
- How much other internal IT support staff will be required regardless of the ERP deployment selected? Do you have a "no IT" strategy, or do you plan on having an IT staff?
- Is the solution a standard multitenant version with automatic updates or a private version that can be changed at your discretion?
- Do you envision wanting some access to customization? How much flexibility is there to customize the solution?

There is nothing inherently bad about any of the deployment options. But a vendor with limited options unnecessarily limits your business' flexibility. One business may want a pure SaaS solution, another may want to virtualize its favorite on-premise solution in a data center and have a third party take care of the system administration, and yet another company may just want to keep it all in-house and have total control. Companies need to be empowered to choose from a menu of options in order to optimize the ERP deployment they use to run their business.

This why choice really is the new cloud.

About The Author—Steve Bieszczat

Steve is responsible for all aspects of IQMS' brand management, demand generation, and product marketing. Prior to IQMS, Steve held senior marketing roles at ERP companies Epicor, Activant, and CCI-Triad. Steve holds an engineering degree from the University of Kansas and an MBA from Rockhurst University.

About IQMS

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IQMS
Manufacturing ERP

Run Your Business in the Cloud

SYSPRO is the leading ERP solution for mixed mode manufacturers and distributors that provides companies with all the software needed to leverage their business – in the cloud, on-premise, or from a mobile device. From single location companies to multi-site corporations, SYSPRO provides the functionality to connect the entire supply chain.

+1 800 369-8649   www.syspro.com   info@us.syspro.com

NetSuite Customer Success Story

CMP Corp. Implements Lean Manufacturing Model with NetSuite to Cut Costs and Power Growth

Customer success

- World's largest independent manufacturer of aftermarket compressor parts for refrigeration and HVAC units runs NetSuite as a core component of a lean manufacturing initiative, aimed at eliminating waste.
- With lean manufacturing, CMP Corp. has systematically transformed its business for greater cost-efficiencies across core business processes in both aftermarket and custom-machined lines of business.
- Through lean manufacturing, CMP has slashed crankshaft production lead time from 85 to 10 days while reducing costs 25%, with NetSuite playing a critical role.
- Since the lean manufacturing initiative got under way in 2009, CMP has netted a 26% increase in revenue while growing the business across 95 countries.
- NetSuite supports CMP's Kanban system for inventory optimization, resulting in a 90% reduction in back orders, worth $300,000 (USD).
- NetSuite inventory management supplies greater visibility and control over more than 3,000 part types and supported a wholesale redesign of CMP's 160,000-square-foot manufacturing facility.
- NetSuite's flexibility allowed CMP to work with partners Centricity Systems and Intente to create a unique "Compressor Configurator" enabling customers to complete entire orders online with automated order processing.
- Introduction of B2B e-commerce capabilities with SuiteCommerce gives customers new ordering flexibility while enabling CMP to broaden business reach and speed cash flow.
- NetSuite Manufacturing Edition enables CMP to streamline production with such capabilities as work orders, bills of material, assembly management, and requirements planning.
- NetSuite's cloud infrastructure enabled CMP to reduce its server count from ten to two while trimming its IT staff by one full-time employee and eliminating reliance on third-party IT consultants.
- Overall IT efficiency has improved 75%, while mobile tablets on the factory floor give personnel on-demand access to critical data on the spot.

Company
CMP Corp.

Location
Oklahoma City, Oklahoma

Industry
Manufacturing/distribution

Website
www.cmpcorp.com

Applications Replaced
Infor Visual Manufacturing

Solutions
NetSuite

NetSuite Manufacturing Edition

NetSuite SuiteCommerce

Challenges

- On-premise Infor Visual Manufacturing application was costly and outdated, and lacked the flexibility and reporting features that CMP wanted.
- From a lean manufacturing perspective, in-house infrastructure with 10 servers and IT resources was viewed as waste that could be eliminated with a move to the cloud.
- CMP wanted to strengthen its disaster tolerance capabilities in view of a tornado that decimated its facility.

Solution

- NetSuite's strong manufacturing capabilities and cloud architecture were seen as an ideal combination to support a lean manufacturing initiative.
- Cloud environment eliminates the risk of data loss from tornados or other on-site disasters.
- Avoidance of high capital expenses for a new ERP solution enabled CMP to focus its resources on devising and implementing its highly successful lean manufacturing program.

Learn more about CMP Corp. and NetSuite in this Customer Story Video.

About NetSuite

Today, more than 24,000 companies and subsidiaries depend on NetSuite to run complex, mission-critical business processes globally in the cloud. Since its inception in 1998, NetSuite has established itself as the leading provider of enterprise-class cloud financials/ERP suites for divisions of large enterprises and mid-sized organizations seeking to upgrade their antiquated client/server ERP systems. NetSuite excels at streamlining business operations as demonstrated in a recent Gartner study naming NetSuite as the fastest growing top 10 financial management systems vendor in the world. NetSuite continues its success in delivering the best cloud ERP/financials suites to businesses around the world, enabling them to lower IT costs significantly while increasing productivity, as the global adoption of the cloud is accelerating.

" NetSuite has given us dramatically better data access and reporting and has been instrumental in our lean manufacturing initiative, helping us reduce cost and waste while achieving double-digit growth. "

—CMP Corp.

NETSUITE

Rootstock Software Customer Success Story

When Planning for Its New Manufacturing ERP, Pacer Group Planned for Success

Established in 1979, Pacer Group (Sarasota, Florida) is a leading wire and electrical cable manufacturer that offers custom electrical products, value-added solutions, and parts distribution. The Pacer group of companies has expanded beyond its traditional marine industry focus at its 42,000 square-foot manufacturing, assembly, and warehouse complex in Sarasota. Our array of capabilities begins with wire and cable manufacturing, and progresses with customer-focused solutions such as battery cable assembly, wire harness assembly, instrument and dash panel design, and complete electrical system integration.

Pacer has integrated three major industrial functions including electrical wire and cable manufacturing, electrical system design and manufacturing, and electrical components distribution. The integration of wire and cable manufacturing, engineering, and distribution provides us with great flexibility in our ability to serve the concerns of individuals and smaller companies as well as large-volume users.

Today, Pacer provides these capabilities to a wide range of manufacturers that require UL/CSA (Underwriters Laboratories/Canadian Standards Association) approved wire, such as makers of batteries, forklifts and golf carts, industrial equipment, alternative power, appliances, and data storage. We also have a wide range of products that serve marine, automotive, truck, RV, and off-road vehicles.

From a manufacturing perspective, the company manufactures products in two basic modes plus undertaking a distribution function. In one part of the business, we run small-lot, complex jobs that entail many parts and changeovers. Another part of the business produces low-complexity, higher-volume products such as wire and cable. From an enterprise resource planning (ERP) standpoint, think of this as a lot-controlled product in which the system processes a new work order, which then becomes finished goods. The final part of the business buys products for resale in a classic distribution scenario.

> "Bottom line—today, we are able to do more with less resources."
>
> John M. Swiatkowski,
> President, Pacer Group

Defining and selecting a new ERP

Our former ERP system had become dated, being too cumbersome and difficult to use while not providing us with the depth of manufacturing that we needed. At the same time, we were at a company size at which it was inefficient to host an on-premise system but that still needed the functionality and mobility which the cloud provides. We also wanted an ERP that would leverage our Salesforce.com system.

Working in concert with Pacer's selection committee, we reviewed reports from Gartner and others on ERP systems that would cover the wide range of businesses that Pacer handles.

Inputs from our sales and marketing people are important to us, and they were already using Salesforce so we wanted to be sure to complement that effort with our manufacturing ERPs. For example, we use OzLINK, which works with the most robust shipping interfaces available for the three most popular carriers: UPS WorldShip, USPS Endicia, and FedEx Ship Manager.

Although OzLink is not a Salesforce-specific application, the open flexibility of the Salesforce.com platform allowed it to seamlessly integrate with Rootstock and dramatically improve our performance. So, to emphasize, we needed a flexible platform that would operate with our other Salesforce tools, and most of the suites we reviewed were too limited.

In our search, it quickly became evident to the team and myself that cloud-based ERP is fast becoming a real alternative to traditional on-premise ERP systems. As the availability of cloud-based software has exploded, the complicated system of interdependent components that work together to enable cloud services has come to be called the "cloud ecosystem." Without question, one of the most popular of these cloud platforms is Salesforce, and Pacer was already capitalizing on it.

We also faced the same problem so many manufacturers have in searching for a new ERP: having to maintain in-house servers would just be too prohibitive. With a cloud ERP implementation, Pacer would eliminate many of the hidden costs of implementing an on-premise solution, including the acquisition of hardware, operating system software, database management software, and other infrastructure products. These items not only carry significant costs but also come with built-in delays affecting the project. When all was said and done, we learned that the largest cost savings may be the ability to start and complete the entire implementation project without having to make that large up-front investment in perpetual license and maintenance fees, which are characteristic of on-premise solutions. We are not alone in understanding this.

In a recent study completed by Gartner (Survey Analysis: Adoption of Cloud ERP, 2013 Through 2023), chief information officers (CIOs) and application leaders were advised to consider cloud ERP as a replacement for old ERP systems that are either no longer supported or are still running on old platforms such as mainframe computers. A total of 47 percent of participants in the survey (companies from North America, EMEA [Europe, the Middle East and Africa], APAC [Asia Pacific], and Latin America that range in size from $10 million to $10 billion) said that they planned to move their core ERP systems to the cloud within five years.

We had one other priority. Other than those that had a multi-million cost, we wanted a platform that could be customized. The cloud provided us with this option as well.

Anyone who has undertaken an ERP implementation knows that there will be customization or personalization required to enhance the usability or functionality of the ERP software. As a result, there will be programming costs borne by either the software vendor or the customer. And, until the customization is complete, the customer is going to incur some delay in achieving improved productivity and efficiency. However, if all software is on the Salesforce.com platform, many of the problems in customization could be avoided.

Eva Wright, Pacer Group's internal information technology (IT) administrator, who is also a certified Salesforce Administrator, notes that by leveraging Salesforce's Force.com, the new ERP software could offer significant advantages for Wright's department to easily provide its own customizations to ERP cloud software written natively on the public cloud platform. Recognizing that there is a significant difference, and benefit, to the open systems on a public cloud, Wright could make informed decisions on which cloud ERP solution will provide a quicker payback and higher return on investment, especially when considering that those latent customization projects can be controlled by her rather than the software provider.

As a result of our research, our team selected Rootstock for our new manufacturing/distribution cloud ERP running on the Salesforce.com platform.

Installing the new cloud ERP

With three different aspects to their business, Wright and I determined that the quickest payback would be to install the new ERP on the lower complexity–higher volume manufacturing side.

Yes, there were some gaps and issues discovered as we went along, but they seemed to be more of a data situation than a process problem. Rootstock set up the manufacturing part and it was good. One reason we selected Rootstock is that the ERP can really handle complex manufacturing and for the selected first installation, we needed something a little lighter. For instance, the basic software has a lot in order entry and we needed something more like what a distributor uses for this side of the business than what we would need for the complex manufacturing side. Working with the Rootstock team made that happen.

"One of the things we learned in this process is the importance of the vendor team," emphasizes Wright. "We wanted a group that was willing and eager to help us. We appreciated how they looked at our business processes and came up with solutions."

We completed this installation December 1, 2014, after working on it since February.

Important ERP modules for Pacer

For us, the Material Requirements Planning (MRP) and Purchasing modules have proven to be very important.

"MRP keeps track of what we need," says Wright. "It's an excellent engine and lets us quickly find out everything on order and determine what we have."

MRP uses information from Sales Order Management to drive the top-level demands. Forecast demands, not only end items but any item, can be entered as well. A forecast demand for an item denotes the start period date and the end period date and the quantity forecasted for that period. MRP performs the traditional "netting" and plans to the greater of the Sales Order Demand and Forecast demand (by period).

The MRP Engine always uses the "effective" Bill of Material (BOM) in its plan. It accomplishes this by reviewing the scheduled pick dates of the planned work order supplies or planned subcontract requisition supplies, and using that date to extract the components that are "effective" and "implemented" as of that date in the generation of the work order and subcontract requisition demands.

Purchase Order Management provides for the entry and tracking of purchase orders for direct and indirect materials and services. This is supported throughout the entire purchasing process, from generation of the requisition through receiving of materials or approval of service provided including accounts payable integration. The module also maintains all vendor information and reporting required by buying organizations to make better-informed purchasing decisions.

"BOM Maintenance is a beautiful thing," highlights Wright. "We can copy, clone, and maintain our BOMs much more efficiently than we could before."

> "One of the things we learned in this process is the importance of the vendor team."
>
> Eva Wright,
> Internal IT Administrator, Pacer Group

Manufacturing or subcontract assemblies are identified within Bill of Material Maintenance. Each component contains a separate record, and standard information associating the component to the assembly can be kept on the Bill of Material. Required information such as the quantity per assembly and the add and delete effectively data is maintained on each component link. Required Add and Delete Effectively information includes status and date, with optional information including revision and engineering change order. Additional capabilities include a scrap factor, "issue to" work centers on the shop floor, and lead time offset for planning purposes. Bills of Material are also used in a Standard Cost Rollup to compute the material cost and the subcontract material cost of the purchased (or subcontract purchased) item.

"It's helpful that the software is browser oriented," adds Wright. "Our staff is used to a browser approach and once they have learned where and what things are, they like the ERP because they understand it."

Business results already showing up

With the system in for only six months, it's still too early to quantitatively say what our results have been or will be, but there are several things that we've already discovered. We've had a dramatic improvement in our inventory management, which lets us serve our customers with dependable, on-time deliveries.

"Our people are enjoying working with the system," adds Wright. "It is so highly customizable. As our people suggest new ideas—voilà—we in IT are able to provide them."

Our old system had a significantly large amount of "tacked" on, non-native solutions to function sufficiently. They were inefficient and required maintenance. Today, with our Rootstock system, this goes away. Versus the old on-premise system, we can now easily work with so many other solutions as Rootstock on Salesforce.com takes care of this. Bottom line, today we are able to do more with fewer resources.

About The Author
John Swiatkowski is president of the Pacer Group and a graduate of the University of South Florida.

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>
> Eva Wright,
> Internal IT Administrator, Pacer Group

About Rootstock Software

Rootstock Software® is a proven provider of powerful and nimble manufacturing, distribution, and supply chain solutions built and deployed on the Salesforce Platform (the world's #1 cloud computing platform). The Rootstock solutions enable real-time management of manufacturing, distribution, and supply chain operations from front to back, anytime and anywhere. The company's manufacturing, distribution, and supply chain apps integrate "out of the box" with Sales Cloud® by salesforce.com and other ERP-centric applications written on the Salesforce Platform. With unparalleled executive experience in manufacturing and distribution software and an established base of installed and implemented cloud customers, Rootstock offers a better and more reliable way to plan and execute required activities, deliver essential information to all parts of the organization, and improve timely and informed business decision making. The Rootstock apps also provide the control and visibility required to elevate the total performance of manufacturing, distribution, and supply chain operations. Rootstock is available on the AppExchange by salesforce.com, the world's most popular marketplace for business apps. To learn more, please follow Rootstock on Twitter @RootstockMFG, visit our Facebook page www.facebook.com/RootstockSoftware or visit www.rootstock.com.

SAP Customer Success Story

Visual Communications Company: Brightening the World with SAP® Business ByDesign®

Visual Communications Company, LLC (VCC) is the largest manufacturer of LED light pipes and LED, neon, and incandescent indicator lights. VCC chose FMT Consultants, an SAP partner, to deploy the SAP® Business ByDesign® solution to manage all of its core business processes. Within two years, VCC expanded from 15 to 150 employees, acquired two divisions, and grew revenue by more than 300%, while successfully managing the increasing size and complexity of its business.

Boosting profits by improving output and control

Objectives

- Streamline production and sales order management
- Automate material planning and procurement
- Improve reporting to enhance decision making
- Support rapid growth and transformation
- Replace multiple disparate and costly systems

Why SAP

- Cloud and browser-based solution with remote connectivity and easy access on any device, including iPads and iPhones
- No need for additional hardware investments
- Scalable solution that supports fast growth
- Ease and speed of implementation
- Fully integrated customer relationship management (CRM) and enterprise resource planning (ERP) functionality

Company:
Visual Communications Company, LLC

Headquarters
Poway, California

Industry
Industrial machinery and components

Products and Services
Innovative LED, incandescent, and neon indication and specialty illumination solutions for global markets (industrial, medical, automotive, aerospace, and transportation)

Employees
150

Website
www.vcclite.com

Partner
FMT Consultants
www.fmtconsultants.com

Why Partner

- 18 years of related industry experience
- Team of experts with extensive experience customizing SAP® Business ByDesign®
- Hundreds of successful implementation and migration projects

Benefits

- Increased revenue—up 300% since implementation
- Flawless management of thousands of open sales orders
- Improved production outcomes—up 500%
- Better analysis of product line profitability through reporting functionality
- Smarter buying decisions and more efficient management of inventory via material planning and forecasting functionality
- Ability to support rapid growth and drive organizational goals

About SAP

Founded in 1972 in Walldorf, Germany, SAP is an international provider of business software and is one of the world's largest independent software manufacturers. SAP has more than 183,000 customers in over 120 countries and employs 55,000 people at locations in more than 50 countries.

" VCC is a dynamic company that is planning continued growth. An innovative ERP solution and expert integration partner are critical to achieving our goals. Both SAP Business ByDesign and FMT Consultants have earned impressive positions on the VCC team. "

Andy Zanelli, CEO, Visual Communications Company, LLC

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S2K Enterprise Applications:

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- Distribution
- Retail
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VAI Customer Success Story

US Air Tool Flies High with VAI's Cloud ERP Software

Company overview

US Air Tool Company (USATCO) has been a family-owned and operated business since 1951. USATCO's founder, Joseph Percz, began the company in the basement of his home repairing surplus aircraft tooling. The company is now a US manufacturer and worldwide distributor of high quality tools for the aviation industry with offices in New York and California. In addition, from the beginning of the homebuilder era in the 1970s, USATCO has been providing tools and equipment to craftsmen around the world who build and fly their own aircraft. These "sheet-metal artists" are now flying thousands of planes built and maintained with USATCO tools.

Challenges

To reduce the complexity associated with running the VAI S2K software on-premise in its New York and California locations, USATCO sought a cloud-based ERP system. The company wanted a solution that would fit within its budget, while also integrating seamlessly into USATCO's IT environment. It was also important for the company to focus more on managing and growing the business, in addition to enhancing customer service, instead of worrying about software and hardware infrastructure.

Why cloud ERP?

Cloud ERP empowers users to access the data they need, when they need it, to improve employee productivity and increase customer service. When the decision to switch to cloud-based ERP is made, organizations are able to deliver ERP software to end-users while eliminating excess hardware and still maintaining control over system integrations, thus reducing the complexity of providing the highest level of customer service. Companies today require a cost- effective cloud solution that meets all of their business needs and doesn't compromise on customer service. Cloud adopters also have the benefit of adding applications such as business intelligence, portal, and CRM capabilities without dealing with infrastructure.

> " Since moving to the cloud, our staff has been able to focus on improving business processes, as well as customer satisfaction and company growth. "
>
> - David Lombardo, Comptroller, US Air Tool Co.

VAI S2K cloud-based ERP:
The natural solution for USATCO

VAI's deep expertise in ERP and reputation for empowering mid-market companies with comprehensive, user- friendly solutions made it the ideal partner to address USATCO's current and future objectives. VAI made the migration to the cloud smooth and seamless for the company's IT and end users. There was no interruption to the business during the go-live phase. VAI assisted USATCO with every step that was required, which included configuring secured connections to the hosted servers, user testing on the hosted server prior to go-live, and configuration of external devices such as in-house printers.

Business results

By adopting VAI's S2K cloud-based ERP solution, USATCO lowered total costs and complexity and transitioned from times of variable costs to predictable costs, while freeing up critical IT resources for strategic initiatives and innovation. USATCO has improved overall business processes and reduced operating costs. Since implementing VAI's S2K cloud solution, USATCO is simplifying its e-commerce process and improving customer satisfaction.

Key benefits

Following the company's VAI S2K ERP cloud migration, USATCO has realized key business benefits, including:

- Reduced maintenance costs: USATCO no longer needs to manage and maintain internal hardware and software separately, providing significant cost savings.
- Data backup and security: VAI S2K Enterprise provides secure access to the ERP system, eliminating the need for USATCO to be concerned with system failures or data breaches.
- Investment protection: With VAI's subscription-based payments, USATCO can invest in other areas of the business, such as purchasing new office equipment, enhancing the website, and expanding manufacturing procedures with the new cloud model to better analyze costs.
- Less personnel training is needed: It takes fewer people to do more work on a cloud, with a minimal learning curve on hardware and software issues.
- Application high-availability: USATCO experiences continuous up-time while experiencing no IT or infrastructure points of failure.

"Mid-market companies require a cost-effective solution that meets all of their business needs and doesn't compromise on customer service. We are thrilled to provide USATCO with an ERP solution that meets the company's business objectives and allows it to focus on company growth."

-Bob Vormittag Jr.,
Project Director, VAI

For more information

For more information about how VAI can help your business and to learn about VAI S2K products and services, call VAI today at 1-800-824-7776, email sales@vai.net, or visit www.vai.net.

About VAI

VAI is a leading independent mid-market ERP software developer renowned for its flexible solutions and ability to automate critical business functions for the distribution, manufacturing, specialty retail and service sectors. An IBM Premier Business Partner, VAI is the 2012 IBM Beacon Award Winner for Outstanding Solutions for Midsize Businesses. VAI continues to innovate with new solutions that leverage analytics, business intelligence, mobility and cloud technology to help customers make more informed business decisions in real-time and empower their mobile workforces. VAI is headquartered at 120 Comac Street, Ronkonkoma, NY with branch offices in Florida, Illinois and California. For more information, visit www.vai. net, follow @VAISoftware on Twitter or "like us" on facebook.com/VAISoftware.

Vendor Directory

Vendor Directory

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Aptean	www.aptean.com
BatchMaster	www.batchmaster.com
Bluebee Software	www.bluebeesoftware.com
eKEPLER	www.ekepler.com/en
Entersoft	www.entersoft.eu
Epicor Software	www.epicor.com
ERPinCloud	www.erpincloud.com
Expandable Software	www.expandable.com
FUJITSU GLOVIA, INC.	www.glovia.com
HarrisData	www.harrisdata.com
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IQMS	www.iqms.com
Jakob Hatteland Computer AS (RamBase)	www.rambase.com
Jeeves Information Systems	www.jeeveserp.com/en
Jobscope	www.jobscope.com
Kenandy	www.kenandy.com
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KeyedIn Solutions	www.keyedin.com
MAXCloud ERP	www.maxclouderp.com
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Plex Systems	www.plex.com
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Vendor Directory

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SYSPRO	www.syspro.com
TOTVS	http://en.totvs.com
Tribridge	www.tribridge.com
VAI	www.vai.net
Visibility Corporation	www.visibility.com
xTuple	www.xtuple.com

About the Author

Aleksey Osintsev, as a research analyst at TEC, focuses on the areas of ERP for manufacturing, accounting and financial software, as well as retail solutions. He has more than 18 years of experience in manufacturing and private sector IT, from both the ERP application user and the corporate software development sides.

Prior to joining TEC, Osintsev was a project manager and chief information officer (CIO) at a smart instrumentation engineering, manufacturing, and servicing company. He led the IT department and was responsible for business systems, including ERP selections, implementation projects, and business processes change management. More recently, Osintsev went through a number of successful ERP implementations, system upgrades, and business management projects as a project coordinator and consultant in the food processing, electronic manufacturing, and apparel industries.

Osintsev earned his master's degree in industrial engineering and business administration.

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Cloud ERP Buyer's Guide for Manufacturing

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