Enhancing and Extending ERP Performance with an Automated Workflow System

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A Practical View of the Benefits of Workflow Systems in ERP Environments

The effective integration of comprehensive, independent workflow systems with Enterprise Resource Planning systems can produce significant improvements in those business processes implemented with the ERP. This synergism fully delivers on the economies of scale promised for centralized ERP processing, while insuring and simplifying the requisite participation of the "expert," often decentralized, knowledge workers.

Practical limitations of most ERP systems are considered, as is the manner in which automated workflow overcomes those limitations to effect greater business process improvement. The results at two businesses are considered, each of which benefited from faster, less costly and more controllable business processes.

Enterprise Resource Planning

Over the last few decades, enterprise resource planning (ERP) changed and now defines the business processing landscape. Virtually every transactional business process is now “automated” by an ERP system, or the related systems for supply chain management (SCM) and customer relationship management (CRM). And the more recent advent of business-to-business (B2B) capabilities with the internet has, in some well-defined situations, extended ERP coverage across and beyond the borders of the enterprise. The efficiencies created continue to boost productivity. Without ERP the business models for many of today’s corporations would change dramatically, if in fact they could exist at all. ERP is a necessity for success in today’s business environment. The transactional volumes in sales, accounting, production, inventory, distribution and the like, that today’s businesses routinely process might be impossible otherwise. So in what way is the “promise” of ERP unfulfilled?

ERP or Enterprise Transactional Processing

Simply put, while ERP is necessary it is not sufficient. The implicit “promise” of ERP included:

1. standardization of the entire business process
2. a central repository of all relevant business process information
3. active, direct support of and participation by the business “experts”

The shortfall against these expectations is principally due to the fact that for most organizations ERP is more accurately “ETP: enterprise transaction

processing." As such, the ERP system is not part of the business process or the associated information until a transaction is processed. Many, if not most, business processes are initiated by activities at the physical edge of the enterprise, but ERP does not usually extend that far. This part of the process, from the outside world to the ERP transaction, usually is standardized, but not by ERP.

Most ERP transactional interfaces are necessarily designed for the data entry processor, not the business expert. Industries are replete with examples of organizational layers, changes and additions with the primary objective being to buffer the business expert from ERP, and sometimes, the ERP from them; the very people who need to see, create, approve, initiate and authorize the life-blood information of the enterprise. These business experts are often managers and supervisors of departments, functions or projects. But may also be those business knowledge workers in purchasing, production, sales administration, distribution, etc., on which the enterprise depends to operate effectively and profitably.

The ERP system is certainly a great place to find discrete data, but only in the context of the transactional process. It wasn't long ago that what is now Information Technology was justifiably called "data" processing. Most interaction with ERP still remains within the constraints of the transactional data processing interfaces.

So for all the tremendous benefits that most ERP systems provide, they can not "internalize" much of the vital business process information; nor encourage and support the interaction of the business experts; nor automate and standardize entire business processes.

INDEPENDENT WORKFLOW SYSTEMS

The development of workflow systems to automate and improve business processes has been, in part, driven by recognition of that which ERP systems can not provide well, or at all. In fact it is not unusual for businesses to implement an independent workflow system with, or immediately following implementation of a new ERP system. At the very least they recognize the potential for increased returns on their ERP investment by adding workflow to extend and enhance their new ERP after its use has stabilized. And for an increasing number of companies, new business processes are designed with the workflow system as a requisite partner with the new ERP system, and they are implemented together.

Independent (i.e. not built into the ERP system) workflow products historically have been far easier to configure and use than workflow imbedded in the ERP. Their flexibility and orientation to the entire process, not just transaction processing, enable independent workflow products to be "business expert friendly." The workflow engine is about the process; the ERP engine is about the transaction. Most ERP systems include at least some form of workflow, but it is either very tightly coupled with the ERP transactional processing or has only a subset of standard workflow functionality. In the first instance, development and maintenance of the workflow schema usually requires considerable efforts from specially trained and thus scarce and/or expensive IT development resources. In the second, the workflow is

of very limited value and rarely capable of effecting entire processes. In neither case is it possible to respond quickly and effectively to the changing process requirements that characterize today's business.

Activity driven workflow systems have also been available for some time and, like ERP systems, are now mature and commonly accepted in a variety of business arenas. In ERP business environments they are now frequently being used to support and supplement ERP capabilities. The workflow system complements the ERP in that it can begin the business process by recognizing an event at the edge of the enterprise, and subsequently manage the capture, creation and validation of transactional information through the process activities. The active participation of the business expert is supported with more usable, business-intuitive interfaces that need not be constrained by the requirements for ERP transactional data entry.

WORKFLOW: THE ERP DATA DELIVERY SYSTEM

In a workflow-centric environment, ERP processing is just another automated activity in the workflow schema. Conversely, in an ERP-centric environment, workflow is the delivery mechanism by which the data required for transactional processing are provided. While ERP processing requires only data, the expert routinely requires knowledge of the business context within which these data exist in order to exercise his expertise. The initiating document often provides that, at the very least acting as the data "container." With an improved perspective, informed operational decisions can be made: approve, order, pay, release, produce, etc., with each such decision ultimately leading to an ERP transaction.

It is still common for the document from the world outside the ERP system to be paper, which is why "imaging" is often part of the business process improvement effort. From a processing perspective, it would be far more efficient if all business were transacted electronically, as B2B. But the "paperless" office remains an elusive target. That is not likely to change any time soon, and in fact the volume of paper generated by business continues to increase. By capturing the external document as an electronic object or image (whether from scanner, fax, email or web) the workflow system can better inform the expert, effectively internalizing that added information for both immediate and continuing use.

INTEGRATION OF WORKFLOW AND ERP SYSTEMS

As opposed to stand-alone workflow systems, workflow in the ERP environment is specifically designed and structured to integrate and co-exist with ERP systems. Stated narrowly, the purpose of this integration is to enable workflow to deliver transactional data to the ERP system. Note also that this integration does not, and should not include transactional processing within the workflow system, as opposed to the ERP system(s). Any duplication creates the potential for conflicting and invalid results, subverting business process improvement at least. The ERP system is a powerful and finely-tuned transaction processing machine that needs to be supported, not replaced. Sometimes this support is required for more than a single instance of one ERP system, and often for multiple, different ERP systems. A common business process can be established across these plat-

forms by deploying a common workflow scheme that incorporates the ERP platforms as different processing activities.

Effective integration of workflow with the ERP system will vary depending on the application, but often provides:

1. validation of new data against existing ERP records
2. extraction of related (process relevant) data from the ERP
3. automated presentation of the transactional data to the ERP data entry staff
4. automated naming (indexing) of all originating and supporting documents as part of the ERP transactional process
5. automated submission of transactional data directly to the ERP, through an ERP utility or edited interface
6. detection and response to changed status of a business condition in the ERP

Items 1, 2 and 6 are implemented with customizable workflow agents (and/or exit programs) require the workflow system manufacturer have reasonable expertise with the particular ERP system. The effective integration for items 3, 4 and 5 commonly necessitates configurable integration modules, requiring considerable ERP expertise and often stringent testing for certification by the ERP manufacturer. This ensures that the workflow system does not in any way corrupt ERP transactional data or processing. The proper design and implementation of the workflow system in an ERP environment requires this level of integration to fulfill the promise of ERP. As illustrated below, this results in processes that are faster (origination to completion), cheaper (reduced manual content) and better (visible and measurable).

THE SHARED SERVICES CENTER MODEL

The Shared Services Center (SSC) is a good business process environment in which to observe the effects of ERP processing with integrated workflow processes. The SSC is commonly established to achieve economies of scale that come from centralization of a corporation's "admin" and processing functions to one physical location. The accounting, finance and human resources staffs, for example, support geographically disbursed business units from the SSC. ERP processing is done by this SSC staff with the remote users networked for various levels of ERP involvement, depending on their function. Centralization of this type is routinely practiced in industries such as construction and property management, where there is a portfolio of far-flung, often changing business units (e.g. projects, properties).

With an SSC, *processing efficiencies* stem from a centralized staff and their use of the ERP system, plus productivity increases from standardization of the entire business process with workflow. *Process effectiveness* is due to the workflow system as a delivery mechanism; delivering the right data to the right people and place at the right time. Through the workflow, the transactional data and documents are readily accessible by internet or private network to the business experts regardless of location. The full benefits of centralization can now be realized since, on the one hand, economies of

scale are available, and on the other, neither geography nor the ERP interface is a constraint to the participation of de-centralized business experts. Experienced business systems professionals may recognize these heretofore irreconcilable factors as the root of the long-standing centralize versus decentralize systems argument. The effective use of workflow can render those arguments moot.

CASE STUDIES

Two cases are presented. They are illustrated by "swim lane" diagrams with activities segregated by type: manual, workflow or ERP. For some measures of productivity improvements exceeded 50 percent. Cycle times for transactional processing and costs per transaction were reduced, while the visibility and management control of the process increased dramatically. For a multi-national manufacturing company, the major benefits derive from the workflow automation which streamlined a comprehensive multi-level management approval process for vendor invoice processing and payment through the ERP. And from the increased capabilities for fully automated, nearly hands-free processing. At a large construction company the workflow system enables the ERP-based, mission-critical pass-through-billing process. This process starts with receipt of diverse expense items in Accounts Payable and is completed when the documents are "passed through" to support and justify a customer's billing in Accounts Receivable.

The workflow system implemented by both companies is DocuSphere®, a business process improvement software product from Image Integration Systems.

THE MANUFACTURING COMPANY

This large, multi national company has production facilities and administrative offices across North America and Europe. The entire enterprise is served by a single ERP system. The challenge was to control and reduce AP transactional costs and to standardize the entire AP process for all locations. After extensive analysis it was concluded that this was best achieved by establishing a SSC, there by eliminating the need for processing at each office. The resulting economies of scale would significantly reduce "manual content" per transaction, with commensurate reductions in staff and costs. It required that all vendor documents be sent directly to the SSC, and development of a comprehensive and controllable delivery process by which the transactional information and documents (vendor invoices, delivery tickets, etc.) could be presented to the ERP system ready to process (voucher). "Ready to process" includes review and approval by the business experts who generate and are ultimately responsible for the transaction, most of whom are in other offices, and in fact in other countries. And virtually none of these experts were users of the ERP system.

Figure 1 represents the process for vouchering (i.e. make ready to pay) vendor invoices that were not generated by purchase orders. For many companies this type of transaction is most problematic in that the ERP system has no prior knowledge of the transaction, as it would if it were related to an ERP-generated purchase order. Note that for purposes of illustration, exception handling activities are not shown. They are a necessary part of

the workflow process, and often require involvement by both business experts and AP processing experts.

Many of the process activities implemented with workflow replace what would otherwise be manual activities. Only five of these 17 "delivery" activities (from numbers 4 through 20) remain manual. And these manual activities are all performed by the business experts, who possess the requisite business information. Workflow further supports the process by interrogating the ERP system with automated agents to validate and acquire process relevant data. (Activities 4, 7, 11, 14). The delivery is completed in activities 18 to 20, wherein the workflow system creates and submits voucher records (reflecting ERP specifications for transactional data) using an ERP utility for batched input. Documents related to each resulting transaction are automatically named (indexed) with the transactional data by the workflow system. As a result of the integration module functions, they are then accessible (viewable) from within both the ERP and workflow system. The transaction processing and reporting is then done by the ERP system, with AP staff review, to complete the process.

Simply comparing the number of activities by type (manual, workflow, ERP) doesn't fully measure the importance of each type. But it is instructional to note that, of 25 activities for this process, four are manual activities within AP, five are by business experts and three are ERP data processing activities. The remaining 13 process activities are provided by the workflow system.

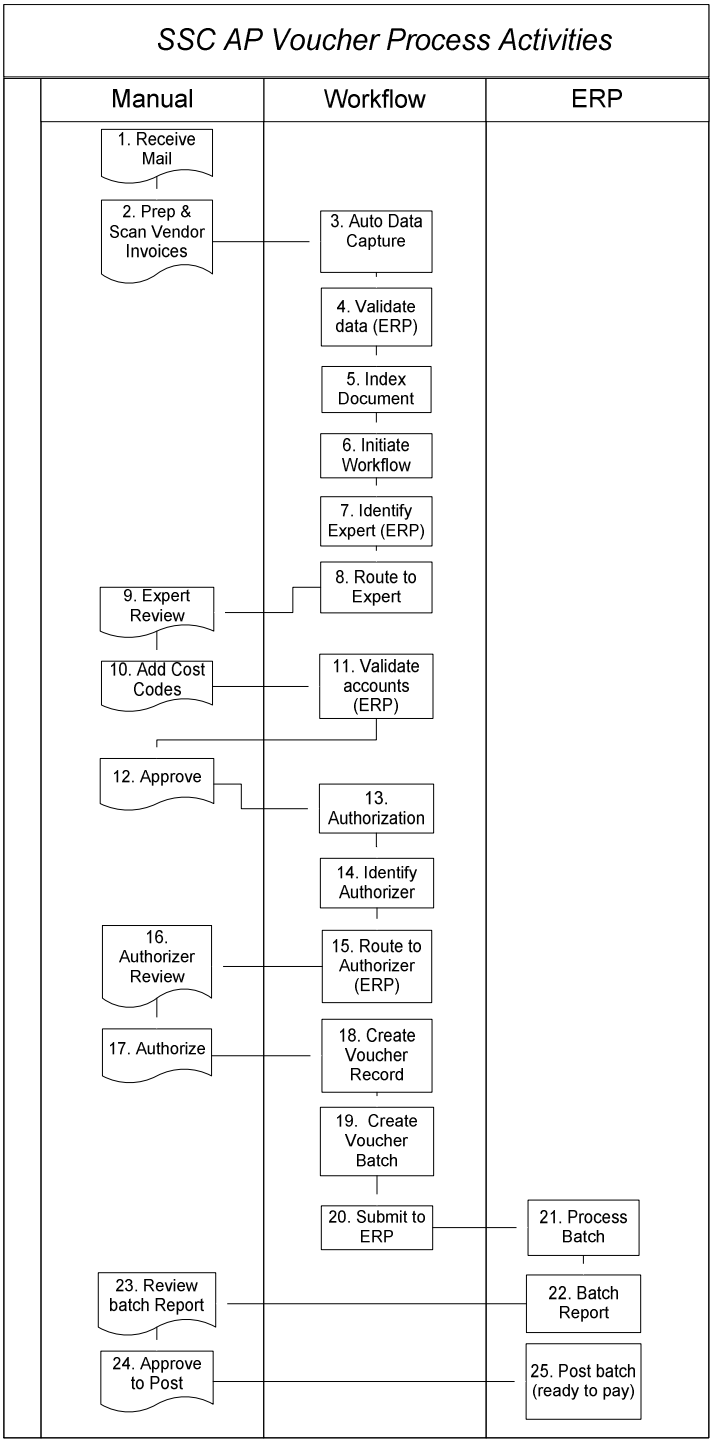
A note on activity number 3, "auto data capture." To further reduce manual activities, this activity incorporates a relatively new capability; automated or advanced data capture (ADC). ADC is based on optical character recognition technology, and provides rules-based methods to extract data from scanned documents. A significant proportion of ERP data entry fields can be captured automatically, further replacing manual data entry. With auto voucher (18-20) the resulting transactions can appear to be virtually hands-free. ADC is shown in workflow for convenience and arguably warrants a swim lane of its own.

The results and benefits directly from, or made possible by, the workflow system are:

1. *the process is fully defined* and standardized by workflow, improving aspects of governance and regulatory compliance.
2. *performance metrics* for each activity and the process as a whole, are visible to and measurable by the process owners.
3. *reduced manual content* per transaction, resulting in overall productivity increases of over 50 percent
4. *directly involved business experts*, interacting appropriately and efficiently, reducing elapsed process time and error frequency.
5. *reduced total process time*; transactions that required weeks are now complete in days, while those that took days are often complete in hours.

The existing ERP system continues to provide effective, robust, high-volume transaction processing, but contributes to the incremental benefits above

only as a necessary sub-set of activities for processing within the workflow process.



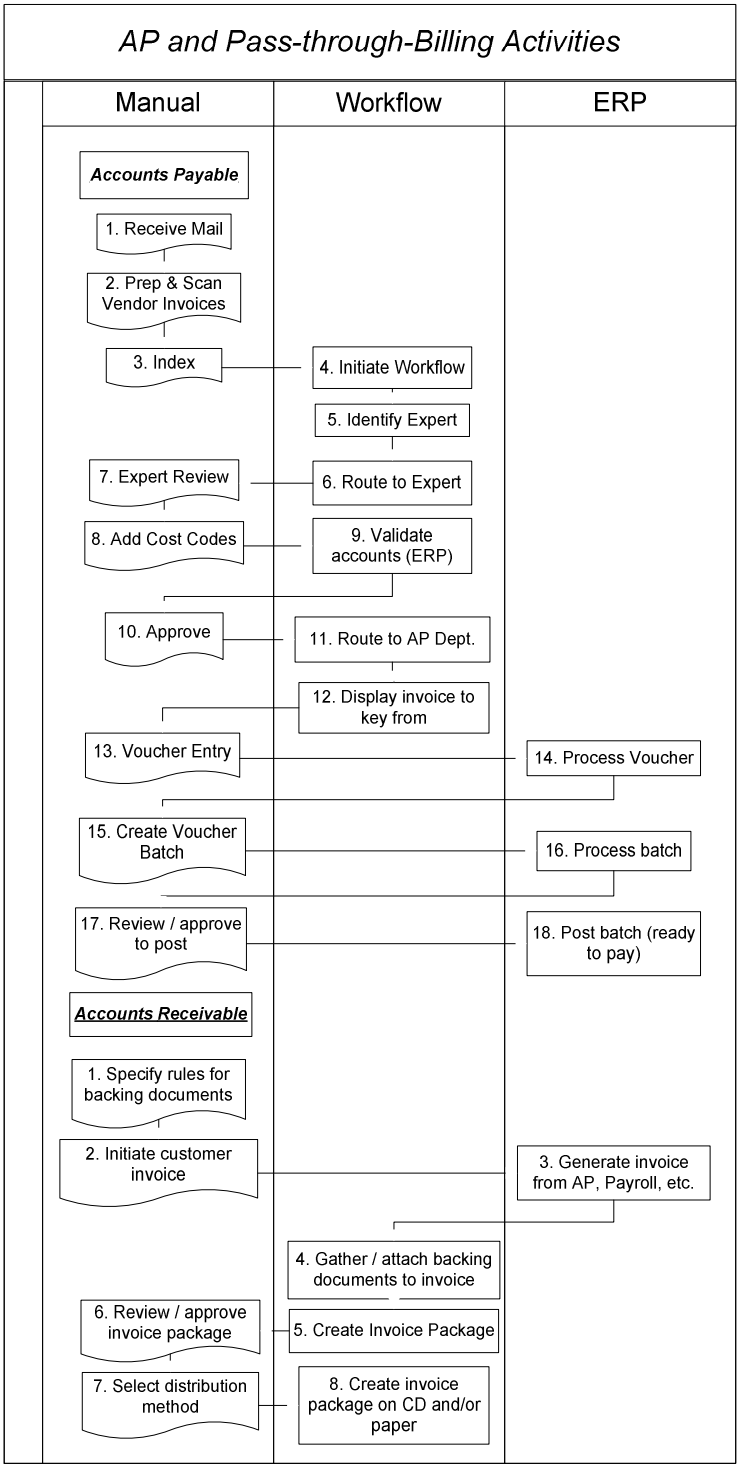
THE CONSTRUCTION COMPANY

Confronted by significant growth challenges, this company replaced their business systems with a single integrated ERP system. To fully satisfy their business objectives the new business processes necessarily included implementation of independent workflow with the new ERP system. This was particularly important for a common type of customer billing process often referred to as pass-through billing. This is illustrated with the simple example of "cost plus" contracts, wherein the customer agrees to pay the building contractor for all the legitimate construction project expenses, passed through to the customer, plus say 10 percent more, the contractor's project profits.

Processing problems, particularly with projects such as the design and construction of large manufacturing facilities, stemmed from the sheer volume of project expense items from AP, Payroll and similar ERP transactional processes. Understandably, the customer demands original documentation to justify the billed expenses. As a consequence, it could be several weeks after an expense item was paid before the customer was billed, this delay caused by the effort to find and organize all the originating documents (e.g. vendor invoices). This delayed creation of the bill, added time and unrecoverable expense (people), and increased the opportunity for error, including under-recovery as legitimate expense items were easily missed.

Figure 2 represents the entire inter-departmental process, starting in AP and completing in Billing (Accounts Receivable). As in the first case, the combination of workflow and new ERP sytems allowed centralization and elimination of AP processors at job sites and regional offices. For simplicity Figure 2 is restricted to non-PO invoices, although in practice there are many PO-driven vendor invoices for construction projects, which the workflow handles with analogous process activities. The AP process issues and benefits in the first (manufacturer) case are equally evident here: standardized processes, performance metrics, reduced costs and total process time, and direct involvement of the business experts, such as project managers at the job sites.

In fact, total AP process time is even more important in this case as it contributes directly to the dead time between the business action that creates the vendor expense and the revenue from billing the customer for that expense. In the pre-workflow process the elapsed process time to voucher entry (AP activity 13) averaged over three weeks. It has been reduced to under two weeks. Management is also currently evaluating ADC and automatic batch vouchering, as described earlier, with the potential to further reduce time and cost.


AP and Pass-through-Billing Activities
Manual
Workflow
ERP
Accounts Payable
1. Receive Mail
2. Prep & Scan Vendor Invoices
3. Index
4. Initiate Workflow
5. Identify Expert
7. Expert Review
6. Route to Expert
8. Add Cost Codes
9. Validate accounts (ERP)
10. Approve
11. Route to AP Dept.
12. Display invoice to key from
13. Voucher Entry
14. Process Voucher
15. Create Voucher Batch
16. Process batch
17. Review / approve to post
18. Post batch (ready to pay)
Accounts Receivable
1. Specify rules for backing documents
2. Initiate customer invoice
3. Generate invoice from AP, Payroll, etc.
4. Gather / attach backing documents to invoice
6. Review / approve invoice package
5. Create Invoice Package
7. Select distribution method
8. Create invoice package on CD and/or paper

Vendor invoices are manually vouchered by AP processors using one of the standard ERP data entry screens. As with automatic batch vouchering, the transactional documents are automatically indexed with relevant transactional data. In this instance the processor does data entry by "key from image," working from the electronic image of the vendor invoice, and related documents, as there is no longer a paper document needed or available. Further, the workflow activities, rules and roles can be configured in a variety of ways to support virtually any business requirement for distribution to the AP processors of documents to be worked. This is most often done by "pushing" the next invoice document from a common work list to a processor who has become idle. As a consequence, the work load is spread evenly over the entire group of AP processors.

The major benefits derive from billing the customer faster and more accurately, and thus recognizing the revenue sooner. This is something of a two-for-one result in that the new process implemented with workflow reduces costs in the AP department while independently increasing revenues in the Billing department. The reduced time to bill is a function of both the ERP system, which has a very effective pass-through billing module, and the workflow system. The originating document was earlier discussed as the data "container" providing context to the expert. In this case that business expert is in the customer's organization, and has a right to the documents for review before payment.

The workflow activities (numbers 4 and 5 in AR) organize all the supporting transactional documents required for the bill by using agents to interrogate the bill detail generated by the ERP system. Since the billing detail includes some of the same data that indexes these documents (e.g. voucher number), they can be organized and presented to match structure previously established within workflow (AR activity 1). Often iterations (drafts) are required before the bill includes all expense items, and only those items, that satisfy the terms and conditions of the customer's contract. As a last activity in the workflow, the processors select the distribution medium for the customer invoice; print to paper or write to CD. The availability of a CD with the customer's bill and all supporting details and documents, provides obvious benefits as compared to paper.

In summary, the AP benefits in this case are much the same as in the first case. In addition however, the customer billing results and benefits due directly to the workflow system are:

1. more than a 60 percent reduction in total time to bill, from over six weeks to under three weeks on average.
2. qualitatively, an increase in completeness and accuracy in the customer bills, reducing disputed items and speeding receipts.

As time is money, these translate to significant revenue improvement.

THE FUTURE

The foregoing is based on characteristics of the vast majority of ERP systems as installed and utilized today. New ERP vendor initiatives with their own workflow, business process management and similar products and architectures will undoubtedly change today's landscape, presumably for the

better. It is reasonable to assume that the flexibility and capability of independent workflow systems will increasingly appear both within ERP systems, and as complementary products from the ERP vendor. Over time therefore, the sources of effective workflow systems for use in ERP environments may change somewhat, but the business requirements will not.

However, at least for the time being, this trend will have little or no effect on the tens of thousands of businesses that use, and for some time will continue to use, today's ERP systems.

SUMMARY AND CONCLUSION

ERP systems are most commonly and correctly perceived and utilized as transaction processing machines. In that role they excel. Workflow systems, integrated with the ERP system, can function as the data delivery mechanism for ERP transactional processing. Conversely, ERP transactional processing is but one of the many activities in the workflow. The integrated result provides capabilities that have been missing with ERP alone: standardization and automation of entire business processes, effective involvement and interaction with the business experts, and, the creation and capture of all relevant business process information. The improved business processes enable the promised economies of scale from centralized ERP processing.