

Best Practices in e-Business Process Management: Extending a Re-engineering Framework



Henry M. Kim¹ and Rajani Ramkaran²

*Schulich School of Business, York University, Toronto, Ontario, Canada¹
FileNET Corporation, Costa Mesa, California, USA²*

Abstract

In formulating e-business strategies enabled by the Internet and WWW, parallels can be drawn from the viewpoint on process enabled by desktop and centralized computing in the 1990s, and that of present day. In this paper, the cornerstone of 1990s thinking on process, Hammer and Champy's nine best practices, are analyzed to apply for e-business process management (e-process management). For instance, Hammer and Champy's first principle is re-stated as "Organize around business rules (Some combined tasks can be performed by stakeholders using interfaces accessed via the WWW)." One finding is that checks and controls may not need to be reduced—as Hammer and Champy espouse—if they are perceived as valuable and can be performed inexpensively using Internet technologies. This work evolves the traditional re-engineering framework to use in current e-business realities; it can be applied to formulate e-business strategies that are rooted in more traditional, and vetted, management thinking.

Keywords: e-process, BPR, best practices, process design

1. Introduction

Adam Smith first introduced the concept of ‘process’ in the *Wealth of Nations* [Smith 1776]. Using a pin factory as an example, he posited that division of labour increased productivity by a factor of hundreds because of the following: Increase in workman dexterity, eliminating passing of work, and capability to use machinery. For over a hundred years, companies of corporate leaders like Henry Ford and Alfred Sloan incorporated these principles, introducing layers of management to coordinate outputs of divided tasks. Hence, the hierarchy was established as the standard model of the organization.

In their seminal work, *Reengineering the Corporation*, Hammer and Champy [1993] argue that this division of labour model designed during the nineteenth century simply does not work as companies enter the twenty-first century. They cite the following reasons.

- Processes associated with twenty-first century products and services are far more complicated than pins, and require many more tasks. Managing and coordinating these tasks as prescribed by the division of labour model are very difficult.
- Several management layers are needed for coordination, which creates “distance” between customer and management. Customers’ needs become too abstract and unknown to managers.
- As task decomposition and coordination becomes an intricate process, adapting it to changes in the environment become more difficult.

They present the concept of re-designing business processes with a clean sheet. They propose to move the organization comprised of a mesh of narrow, task-oriented jobs to one comprised of multi-dimensional jobs where workers are expected to think, take responsibility, and act. They present nine best practices to aid in this transformation.

Now that the twenty-first century has arrived, many executives wonder how the Internet bears on design of organizations. How can it better realize Smith, and Hammer and Champy’s model? Perhaps, the capabilities afforded by the Internet and accompanying technologies necessitate a revolutionary change in how businesses are organized. Emergence of desktop over centralized computing enabled worker autonomy fundamental to Hammer and Champy’s model that challenged Smith’s. Is their model still valid as Internet computing emerges as the dominant paradigm?

In this paper, the research question addressed is as follows: How can Hammer and Champy’s best practices for process re-design be leveraged for use in design of business processes in the Internet age (“e-process design”)? A conceptual framework is utilized as the research methodology to identify the key similarities and differences between Hammer and Champy’s process design in the 1990s and the present. A conceptual framework is most appropriate, as no framework for this type of analysis exists currently. However, the conceptual framework is built upon a well-established framework (i.e. Hammer and Champy). In Section 2, the process design and re-engineering literature is briefly reviewed. In Section 3, the key Hammer and Champy and e-process management concepts are reviewed. Then in Section 4, Hammer and Champy’s nine best practices are translated with the e-process management perspective, and re-stated or revised using e-process management terminology. Finally, in Section 5, concluding remarks and future work are stated.

2. Literature Review

Adam Smith first established the link between people and processes when he analyzed the operations of a pin factory. His ideas are still referenced by business management literature, e.g. [Avishai 1994; Hammer and Champy 1993]. Smith's ideas persist because they describe how to attain capitalistic goals, and explore individuals' motivation to perform tasks required to reach these goals [Hetzel 1984]. While capitalistic goals and individual motivation may not have endured radical change, critics like Avishai argue that the business environment has changed significantly since Smith's days. Hammer and Champy challenge the model that people work more efficiently when they only have a single, simple task to perform.

Quinn *et al.* [1996] state the importance of noting and acting upon changes in the business environment: "If managers merely replicate past practice, as companies did when they installed electric motors in multilevel mill factories, they will miss the power of new technologies to redefine the entire business in relation to all of its environments". According to what has now become the *de facto* view, information technology is a key catalyst for redefining or re-engineering the entire business to fit the new context [Davenport and Short 1990; Davenport 1993; Khalil 1997].

Hammer [1990], then, he and Champy [1993], give guidance on Business Process Re-engineering (BPR). Many others also provided how-to "recipes." Harrington [1991] defines an improvement, rather than revolutionary re-design, based on concepts from Total Quality Management (TQM) works. Others who espouse re-engineering principles are Ligus (agility focused) [1993]; Talwar (strategy-driven) [1993]; Booth (management accounting focused) [1994]; Miller (as aphorisms) [1995]; and Klein (principles much like Hammer and Champy's) [1995]. Atefi [1997] systematically argues that these re-design heuristics have much in common, and attempts to distil these commonalities. Hammer and Champy's "commonalities in reengineered business processes" is used as the key reference for this distillation, and other works are compared to it. This is a reasonable choice given that Hammer, in particular, is widely recognized as the inventor of re-engineering, and the one who coined the term, BPR [Hammer and Champy 1993]: "*Business Process Reengineering is the fundamental rethinking and radical redesign of business process to achieve dramatic improvement in critical contemporary measures of performance such as cost, quality, service, and speed.*"

Other definitions all revolve around the same theme of corporate renewal and focus on processes. The premise is that if a process is broken down into small and simple tasks, then their sum may not achieve the intended or desirable performance of the unbroken process. Such a process and organizational structures that support it must be "obliterated," and new ways of accomplishing work, invented.

Hammer's original seven best practices and principles [1990] are the following:

1. Organize around results and outcomes, not tasks (several jobs are combined into one)
2. Have those who use the output of the process perform the process (workers make decisions)
3. Subsume information-processing work into the real work that produces the information (the steps of the process are performed in a natural order).
4. Treat geographically dispersed resources as though they were centralized (hybrid centralized/decentralized operations are prevalent).
5. Link parallel activities instead of integrating their results (reconciliation is minimized)

6. Put the decision point where the work is performed, and build control into the process (checks and controls are reduced).
7. Capture information once and at the source (work is performed where it makes most sense)

Hammer, with Champy, also adds two more:

8. Processes have multiple versions
9. A case manager provides a single point of contact

It is important to note that BPR has been heavily criticized in the literature for its high failure rate. However, many of the reasons cited for the failure of BPR projects do not challenge BPR as a concept but rather point to the lack of implementation considerations [Teng *et al.* 1998].

Coincident with the popularity of re-engineering was the maturity and adoption of the Internet and the World Wide Web (WWW). Just as desktop computing in the 1980s and 1990s served as catalyst to the re-engineering movement, the Internet and WWW can be viewed as the catalyst for the radical change in business context and business process viewpoint—what Keen and McDonald [2000] term the *e-process* perspective. Rayport and Sviolka [1995] argue that this perspective may entail managing the physical and “virtual” worlds as separate and mutually dependent realms of operations.

To understand how, if at all, e-process is different from pre-Internet ‘process,’ the following quote from Bill Gates [1999] is helpful: “If the 1980’s were about quality, and the 1990’s, about re-engineering, then the 2000’s will be about velocity.” Gates’ notion is that of velocity of change in business models and practices, and not process efficiency gains. He states that the new era is about not only competing on efficiency and effectiveness but also responding to emergencies and opportunities, and the move from re-engineering to velocity entails exploring process designs that enable such competitive capabilities.

While these works look at business process in the context of Internet-enabled economy as a new concept, others try to extend to it from a re-engineering perspective. The term, Business Process Management (BPM), is used for this perspective [Hammer and Stanton 1999; Teng *et al.* 1998; McDaniel 2001]. It can be debated whether the appropriate perspective on processes should be e-process management or business process management. However, the literature generally agrees—e.g. [Hammer 2001]—that the thinking on processes has evolved from emphasis on one shot reengineering to on-going process management. More importantly, the literature agrees on the importance of radical change in business process thinking as the most successful way of implementing processes when business paradigm changes dramatically [Zinser 1998].

Given that the underlying principle of Hammer and Champy’s and others’ works is also radical change, it is likely that their fundamental concepts are applicable to e-process management or BPM. This likelihood can be put in context with some observations discerned in this review. There is a close relationship between BPR realizable with PC and centralized computing, and e-process or BPM realizable with Internet computing. Hammer and Champy’s nine best practices (reengineering commonalities) represent by far the most seminal succinct framework for BPR. It cannot be said that there is such a seminal work for e-process management or BPM. There are those that present case studies and discuss new business models for Internet enabled processes [Kalakota and Robinson 2000; Weill and Vitale 2001], but these do not explicitly identify general best practices, principles, and heuristics.

An interesting discourse of analysis then arises. Assume that e-process management/BPM, call it *e-process management*, is mostly an extension of BPR, but fundamentally different in some respects. What is similar? What is different? One way to answer these questions is to analyze Hammer and Champy's nine best practices in the context of business uses of the Internet, and translate or update the best practices to fit with an e-process management perspective. Similarities and differences with the nine can be examined. More importantly, these e-process management best practices can be used as a set of guidelines, rooted in well-acknowledged principles of Hammer and Champy, to aid the e-process designer.

3. E-process Management

3.1 E-process Management vs. BPR

The e-process management perspective is predicated on the significant increase in the power of the customer afforded by Internet and WWW use. If Smith's hierarchical organization was attuned for mass production, and Hammer and Champy's re-engineered organization, for product differentiation (customization), then e-process management supports efforts towards mass customization, the capability to offer unique value to fickle customers without sacrificing economies of scale for the organization. The following MRO procurement process discussed by Keen and McDonald [2000] highlights how an e-process management model supports mass customization, as different from a traditional business process model.

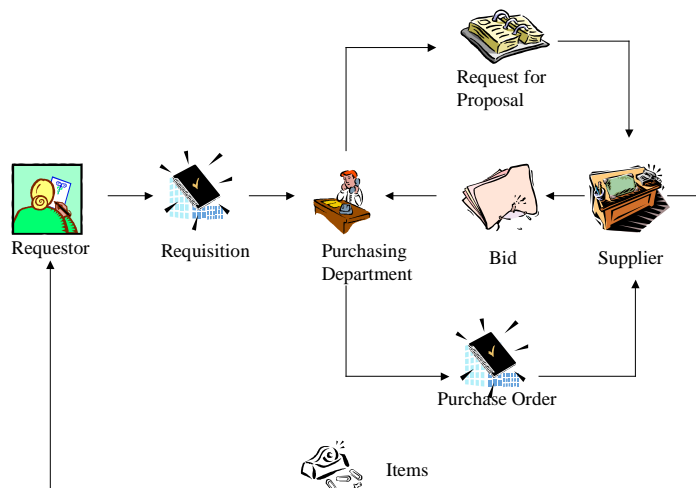


Figure 1 – Sample MRO Procurement process

Source: Keen and McDonald [2000]

Figure 1 illustrates the traditional view of a material requisition process. The requestor submits the request for supplies to the purchasing department, which sends out a request for proposal to locate a supplier. Various suppliers submit bids that are evaluated by the purchasing department, which then selects an appropriate supplier.

The purchasing department then issues a purchase order to the supplier. The supplier finally ships goods to either the purchasing department or the requestor.

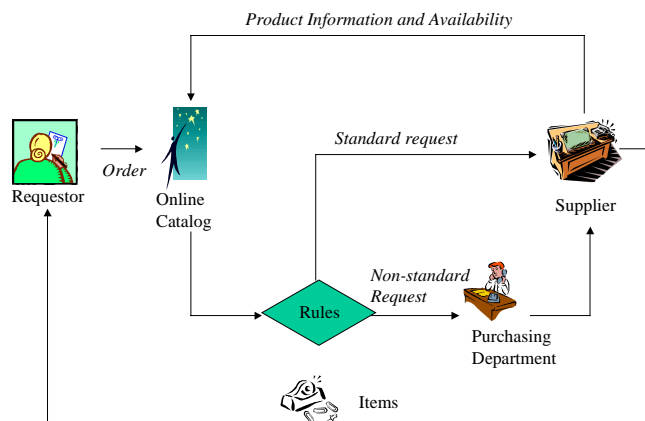


Figure 2 –eProcurement for MRO Purchase

In the e-process management model, operational knowledge in the purchasing department is extracted and codified into business rules handled by a system, which handles all standard requests that are then fulfilled directly by the supplier. The purchasing department now handles non-standard requests that are more difficult to codify and where humans provide greater added value. For standard orders, the customer is able to self-serve for convenience, and immediately receives information about product and its availability. This is an example of e-process management design towards mass customization: Efficiencies are realized by automatic application of business rules, yet, unique value is still provided to the customer.

Enterprise resource planning (ERP) systems do provide some of these elements. However, unlike Internet and Web-based systems, ERP systems are technologically complex and expensive. This essentially created an entry barrier for many mid and small participants in the value chain including retail customers. Thus, while conceptually, ERP systems could deliver on this type of a vision, in reality, it could not be leveraged in the same manner. As noted earlier, the Internet and WWW are important catalysts to e-process. They do this by providing a pervasive technology platform that is widely accessible to every participant in the value chain.

The following table summarizes the key differences between BPR and e-process management perspectives. The sources of the information are Keen and McDonald [2000], and Hammer and Champy [1993].

	BPR	E-PROCESS MANAGEMENT
--	-----	----------------------

	BPR	E-PROCESS MANAGEMENT
Key Drivers	<ul style="list-style-type: none"> • Process focus • Radical change • Move from functional silos to horizontal, and hence a more process centric, view • Big targets are set and processes are re-engineered to achieve them • Focus on end-goals such as productivity, quality, and cost, even before BPR begins • Value of BPR is to the firm 	<ul style="list-style-type: none"> • Customer in control of the process • Non-linear: hub and spoke model with customer in the centre initiating questions and requests, and receiving answers and offers • Non-linear process model with strong focus on value networks leveraging collaboration and alliances, rather than just business processes inside the company • Value focus vs. process focus alone • Processes viewed as assets • Value of e-process management is to the customer and other stakeholders
Basic Rules	<ul style="list-style-type: none"> • Have strong, rigorous project management • Have unhesitating support from executives • Set aggressive goals 	<ul style="list-style-type: none"> • Many basic rules in BPR apply • One key area of differentiation is extemporaneous goal setting: “Trial by fire and learn as you go”
Characteristics	<ul style="list-style-type: none"> • Process typically comprised of sequential, linear and discrete steps • Input-process-output view of business process • Focus on standardizing business process for efficiency • Focus on core processes (Hammer: “hardly any company contains more than 10 principal processes”) • For example in supply chain management, supports simple intra-organizational processes, e.g. EDI processing 	<ul style="list-style-type: none"> • Recurrent: More frequent a process, more worthwhile to do it well every time • Business Rules: Defines what each stakeholder expects of the other as well as each stakeholder’s responsibility • Interfaces: Processes execute across an interface where stakeholders exchange information and conduct business according to the rules. Interfaces enable inter-organizational processes more easily • Sourcing—who does the work—is important to consider • For example, in supply chain management, supports inter-organizational value networks (supply chain choreography)
Other Noticeable areas within organization	<ul style="list-style-type: none"> • Customer-supplier mentality 	<ul style="list-style-type: none"> • Roles between stakeholders blurred (links to each other’s web site for ‘Amazon associates’)

Table 1 – Comparison of BPR and e-Process

3.2 E-process Management Definition

Hammer and Champy define business process as—“*a collection of activities that take one or more kinds of input and create an output that is of value to the customer.*” An example business process is mortgage processing. This process involves several activities, one of which is ‘risk evaluation of client.’ This activity can be decomposed to the following tasks: (i) perform credit check and (ii) perform net worth calculation. The input is mortgage application sent in by the branch, and the output is the mortgage product.

For an e-process, the breakdown into activities and tasks is not as important as the operational information used by workers to execute tasks. Rather than as a rigid collection of activities, an e-process can be considered a more flexible collection of business rules used by workers to organize and execute activities. For an e-process, many stakeholders provide inputs. In the case of mortgage processing, the initiating input is the mortgage application. But this can arrive from a variety of sources including on-line customers, mortgage brokers, and the branches. The arrival of this input into the mortgage processing process in itself could be governed by other processes. The output is also no longer simply the mortgage product. An e-process can present the mortgage product but also additional complementary products such as insurance and home equity loans (possibly governed by other processes). The output to the customer then becomes a unique value proposition rather than merely the mortgage product. Activities such as risk evaluation could be codified and performed by systems with only exceptions being directed to a human.

Based on the analysis, the following definition of e-process is presented to guide the translation of BPR best practices.

E-process is a collection of business rules that can be applied, using the Internet and WWW, on any recurrent request (input) that then coordinates web of interactions (processes/additional input) across the value network extending from customer, firm and suppliers (stakeholders) to deliver unique value (output) to these stakeholders.

4. E-process Management Best Practices

1. Organize around results and outcomes, not tasks (several jobs are combined into one).

Adam Smith states that efficiency is achieved by decomposing processes into tasks. This re-engineering best practice eschews that notion and instead calls for emphasizing results and outcomes of the tasks, not the tasks themselves. Regarding the procurement process in Figure 1, a re-engineering design calls for one worker from purchasing to request proposal, bid, and generate purchase order, rather than have separate, specialized workers perform each task. In Figure 2 (e-process management perspective), standard requests, bids, and purchase orders are not processed manually, but rather using business rules. Online catalogs provide an interface to interact with the initiator of the process. According to the e-process management definition, business rules dictate outcomes, and results for tasks initiated from recurrent, routine requests. Such tasks may be combined into one, performed by the stakeholder using an appropriate Internet-enabled interface. Hence, translation of this best practice using e-process management terminology and concepts is the following: *Organize around business rules (Several recurrent tasks are combined into one. Some combined tasks can be performed by stakeholders using interfaces accessed via the WWW).*

2. Have those who use the output of the process perform the process (workers make decisions)

This best practice reflects Hammer and Champy's belief that workers should be given more power and information to make decisions previously made by managers in hierarchical organizations. The Internet and e-process management perspective enable the extension of power and information to the customer via such services as on-line catalogs and bill payment, and to the supplier via, for example, inventory replenishment services. This best practice is still valid for e-process management, with the proviso that the scope of those whose decisions are supported must be widened to include any other stakeholders of the value network, who receive value from the process' output. Hence, *Have those who receive value from tasks, perform them (Automate recurrent tasks; Enable stakeholder participation in tasks via the WWW).*

3. Subsume information-processing work into the real work that produces the information (the steps of the process are performed in a natural order).

Hammer and Champy stress that a task should be designed to overlap, if possible, rather than require completion before another starts. Particularly, if one task produces information and another processes it, this natural flow should not be impeded in process design, but rather subsumed into the design of the information-processing task.

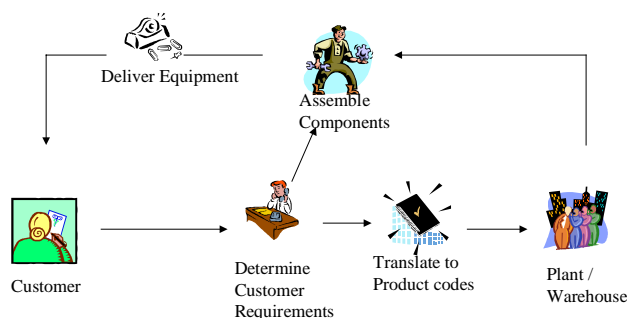


Figure 3 – Customer Order Processing – Traditional View

They cite one manufacturer who needed five steps (sets of tasks) to go from the receipt of a customer order for equipment to its delivery and installation, where different departments performed each step. They re-engineer a new process, which entails performing steps in parallel, resulting in reduction of customer order fill time by 90 percent. This design is shown in Figure 3.

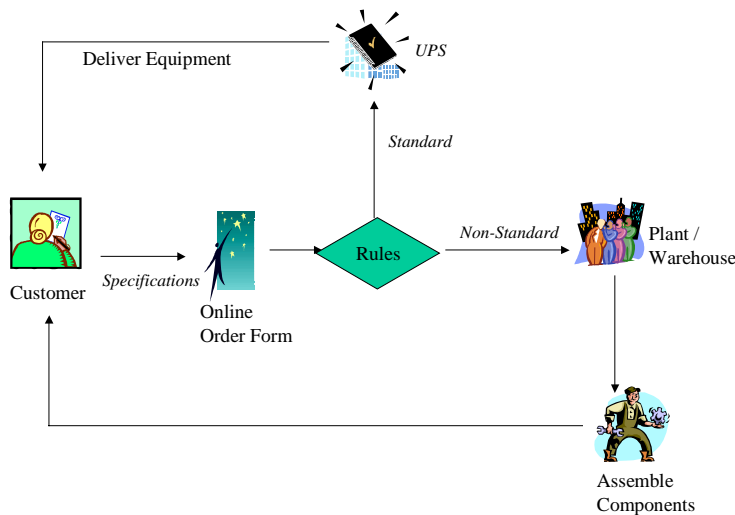


Figure 4 – Customer Order Processing – e-Process View

Figure 4 illustrates one possible design under an e-process perspective. First, the customer enters the order directly, bypassing step 1 from the previous design. Second, certain aspects of the process are codified into business rules, enabling the system to make certain decisions. Third, a third-party (e.g. UPS) vendor is engaged to expedite delivery of simpler products. Not only are e-processes comprised of “de-linearized” tasks, but also these tasks can be specified with Internet-enabled interfaces to work with the value network stakeholders like UPS. Hence, *Subsume information-processing work into the real work that produces the information (the execution of business rules are performed in a natural order, even if they are performed by other stakeholders or processes across the WWW).*

4. Treat geographically dispersed resources as though they were centralized (hybrid centralized/decentralized operations are prevalent).

The capability to leverage information technology to do work where it makes most sense underlies this best practice. For instance, using centralized databases and telecommunication networks, companies can link with separate units or individual field personnel, providing them with coordinated and centralized support and management while maintaining their individual flexibility and responsiveness to customers. The e-process management perspective extends this to geographically dispersed units within the value network. Sometimes, Internet enabled work performed by customer, supplier, or outsourcer makes the most sense.

For instance, in Hammer and Champy’s process, a mortgage obtained by a broker involves the broker calling a local branch, wherein information is entered to systems that are connected to the host computer at the head office, and the branch sending paper work to head office after approving the mortgage. In the e-process management perspective, banks dis-intermediate branches from credit processing, allowing branches to forgo involvement in mortgage transactions to focus on much higher-value provision of retail investment products. The customer or broker can directly access head office systems, input the mortgage, and receive approval online without branch involvement. The broker also has access to all the latest products, bank rates, etc. via a mortgage broker portal. In many instances, it may make sense to

move back to centralized operations because of the ubiquitous access due to Internet use. The branches or geographic units then become a ‘value-added’ service operation rather than an active participant in a process in which it need not be involved. The capability to best realize value determines resource use, not geographical or organizational proximity. Hence, *Treat value as realizable by all stakeholders, irrespective of geography or organizational boundaries. (Hybrid centralized/de-centralized, inter-/intra- organizational use of business rules and interfaces are prevalent; implementing is less challenging as the WWW treats everyone as equally available for participation).*

5. Link parallel activities instead of integrating their results (reconciliation is minimized).

Hammer and Champy argue that even with parallel activities, the aspect of integrating the outcomes of parallel activities that must eventually come together can cause more unnecessary rework, costs, and delays. They recommend that such parallel activities be linked continually and coordinated during the process. They cite Kodak’s use of ‘concurrent engineering’ to exemplify this principle. Several parts engineers worked in parallel to design the individual parts. The manufacturing engineers did not begin work until all the parts designs were completed (28 weeks). Kodak reengineered this process by using an integrated product design database that collects and combines each part design engineer’s work. Each morning, the design groups inspect the database to determine whether someone’s work in the previous day has created a problem in the overall design. If so, the problem is resolved immediately rather than after months of wasted work. In addition, the manufacturing group is able to begin their tooling design just ten weeks into the development process, as soon as the product designers have given the first prototype some shape.

In the e-process management perspective, giving suppliers access to such systems via the Internet further enhances collaboration. Telecommunication infrastructure (private network) costs in the 1990’s made smaller suppliers’ collaboration prohibitively expensive. Now, suppliers can participate in design sessions virtually using inexpensive Internet-based collaboration applications. Latest design specs can be sent to the suppliers for their input using e-mail. Suppliers can also directly access prototype designs created by design engineers to start component manufacturing. Previously, it was expensive to coordinate and link parallel activities, so their results were integrated instead. Now, even a large number of stakeholders in a value network can be linked using inexpensive Internet-based interfaces that are ubiquitous, standardized, easy to use, and synchronous. Hence, *Link parallel tasks using Internet-based interfaces instead of integrating tasks’ results (Processes are comprised of web of processes and reconciliation is performed within).*

6. Put the decision point where the work is performed, and build control into the process (checks and controls are reduced).

Insurance companies traditionally dispatched claims adjusters and appraisers to assess automobile damage to determine repair costs. This control step was designed to ensure against inflated billing by body shops. Hammer and Champy argue that the goodwill costs—agitated claimants, those that sue—of this step may be greater than over-billing costs of not performing it. They advocate that the control step be taken only for large claims, and smaller claims automatically processed as long as approved, periodically reviewed body shops perform repairs.

Today, the body shop can easily send a picture of the damaged vehicle via web camera (costs under \$100). The insurance company can review and approve repair

cost in less than 5 minutes, if need be. This is an extension of what Hammer and Champy advocate, where the body shop review can now be performed much more cheaply and more often. The result is that cheating body shops can be caught easier, and customers are freer to choose their own body shops. UPS utilized barcode technology to track packages for internal audits. This was a control step whose value would not have been apparent to customers. Today, they have exposed this capability using Internet interfaces for customers to track their own packages. Customers perceive this as an added value. Both cases are examples where Internet technologies enable inexpensive checks and controls that are of value to stakeholders. Hence, *Prudently use business rules and interfaces for control tasks, especially if stakeholders can perform them (put checks and controls if and where they offer value).*

7. Capture information once and at the source (work is performed where it makes most sense)

Hammer and Champy state a purchasing example where a company discovered that it expended \$100 in internal costs to buy \$3 worth of batteries. This is because of excessive use of specialists; For example, when accounting needs pencils, purchasing buys them. Purchasing finds vendors, negotiates price, places the order, inspects goods, and pays the invoice, and eventually accounting gets its pencils. This company reorganized their process by giving each operating unit a credit card with \$500 credit limit (over 35 percent of this company's purchase orders were for less than \$500). The purchasing department provides a list of vendors with whom they have negotiated prices, and offloads some purchasing responsibility to the end consumer of the product. In the e-process management perspective, the supplier is able to email specials to specific departments in addition to enabling the purchasing department to publish a list of authorized suppliers on an Intranet. Tasks such as inquiring on status of an order can also be facilitated. Hence, *Capture information once and at the source, even if by other stakeholders (Tasks are performed wherever it provides the most value).*

8. Processes have multiple versions.

This best practice highlights the importance of designing processes to deal with many contingencies. According to the e-process definition, this would translate to the need to have flexible business rules and support multiple interfaces. This can also be viewed in the context of the 'web of interactions.' In this context, the process is no longer limited to one single entity but could be a number of entities with interactions among them. Hence, *Processes interact with other processes to create a web of interactions to achieve service delivery (Processes are streamlined as much as possible (one version) and other processes (web) are initiated to handle exceptions).*

9. A case manager provides a single point of contact.

In the e-process perspective, case managers should still exist. However, the function of this role goes beyond the single point of contact. First, the case for single point of contact is diminished as the visibility to the process is enhanced throughout its execution. However, the human contact point should be leveraged to manage exceptions, as this is when the single point of contact is most needed. In addition, the case manager role could also be leveraged to provide enhanced value beyond the delivery of the service. For instance, in the order request example, case managers can be the point of contact if a significant change to the order needs to be made mid-stream in the process. They can also focus on guiding the customer to add-on services

such as extended warranty programs and new product and service offerings. In this context, the case manager is not just used as a single point of contact for the customer, but also leveraged by the vendor to up-sell and cross-sell on the opportunity. Hence, *Case manager provides a human point of contact for the customer but this is also leveraged by the vendor to generate additional business (Tasks are not solely focussed on delivering the requested product or service to the customer but also value).*

Concluding Remarks and Future Work

In this paper, an e-process management perspective is outlined as a translation of Hammer and Champy's nine best practices in the current age of ubiquitous Internet use and increased customer expectations. An e-process is executed using business rules and interfaces that transform recurrent requests, process them via a web of interactions involving the firm, its customers, and other stakeholders in its value chain, and deliver unique value to the stakeholders. Characteristics of these business rules and interfaces are the following:

1. Inclusion of all participants in the value chain when designing an e-process.
2. Optimizing process across the value chain to maximize value to the customer.
3. Leveraging technology and design interfaces to maximize agility across the value chain.
4. Designing processes that do not necessarily end when output is delivered and recognizing that a process may be a web of processes.
5. Noting that checks and controls are easier to implement and utilizing them if and where value is added.
6. Maximizing visibility to the process to all stakeholders and minimizing the use of a central point of contact for status information.
7. Leveraging the case-manager role to both service the customer for exception processing and the vendor in delivering value added services and generating additional revenue.

What sets the e-process management perspective apart from Hammer and Champy's thinking is the use of business rules and interfaces to provide value to all stakeholders, particularly the customer, not just the firm. Of special note is the re-emphasis, harkening back to mass production, on enforcing checks and controls. This is the one result, which is fundamentally counter to what Hammer and Champy posit. In the e-process management perspective, stakeholders can and should control quality costs effectively using Internet technologies, if the capability to dictate quality is perceived as an added value.

Quality management in the Internet age then is a fitting topic for future work motivated from this paper. Of the many definitions of quality [Garvin 1984], consider the standard ones. Traditional manufacturing-based ("Quality is conformance to requirements" [Crosby 1979]) or economics-based (differences in quality reflect differences in values of measurable characteristics of a product) definitions assume that customer needs have been translated to requirements whose satisfaction can be measured. These measurements are the checks and controls that Hammer and Champy eschew: If the product were made perfectly, they would be unnecessary. Not surprisingly, this form of quality control is often perceived as "a necessary evil" that adds little value to the product. Consider then this definition: "Quality is neither mind nor matter, but a third entity independent of the two... even though it cannot be

defined, you know what it is” [Pirsig 1974]. A customer may be unable to define quality until s/he sees the product. E-process business rules and interfaces give the customer and other stakeholders greater access to “see,” assess, and influence the quality of a product, and to do so inexpensively using Internet technologies. Checks and controls are no longer just internal quality control, but rather efforts that deeply involve the stakeholders in specifying their quality needs. Testing this conjecture by forming a conceptual model for e-process quality management based on current literature represents a worthwhile future work.

A limitation of this paper is that the translated best practices are not validated rigorously. Atefi [1997] states that best practices heuristics are useful at process design initiation, as they identify various attributes of successful processes and enable companies to look for design alternatives. It is stated that, in general, heuristics are ambiguous. Their benefits are often not clearly stated, and techniques for their application are vaguely outlined. In addition, they are unreliable, as the scenarios under which they do not apply are not characterized. Atefi then formulates a formal semantic data model to address these deficiencies. In a similar vein, Buzacott [1996] formulates formal mathematical queuing models for each of Hammer and Champy’s best practices, and postulates that a high degree of variability in task times is generally necessary for the best practices to apply appropriately. Barua et al. [1996] apply complementarity theory from economics and a business value modeling approach to analyze re-engineering projects using a strong theoretical foundation. Methods from these formal or theoretically grounded models must be applied in future work to validate the e-process management best practices, and characterize appropriate conditions for their application.

5. REFERENCES

1. Atefi, K. (1997). “Formal Models of Business Process Engineering for Design and Design Validation”, *M.A.Sc. Thesis*, Department of Mechanical and Industrial Engineering, University of Toronto, Ontario, Canada.
2. Avishai, Bernard (1994). “What Is Business's Social Compact?”, *Harvard Business Review*, Jan.-Feb., pp 38.
3. Barua, Anitesh, Lee, C.H. Sophie and Whinston, Andrew B. (1996). “The Calculus of Reengineering”, *Information Systems Research*, Vol. 7, December, pp. 409-428.
4. Booth, R. (1994). “Simple as ABC, What on Earth is Business Process Re-engineering?”, *Management Accounting*, September 1994, p. 18.
5. Buzacott, J. (1996). “Commonalities in Reengineered Business Processes: Models and Issues”, *Management Science*, Vol. 42, No. 5, pp. 768-82.
6. Crosby, P. B. (1979). *Quality is Free: The Art of Making Quality Certain*, New York: McGraw-Hill.
7. Davenport, T. H. (1993). *Process Innovation: Reengineering Work Through Information Technology*, HBS Press: Boston, MA.
8. Davenport, T. H, and Short, J. E. (1990). “The new industrial engineering: information technology and business process redesign”, *Sloan Management Review*, Vol. 31, No. 4, pp. 11-27.
9. Garvin, D.A. (1984). “What does ‘Product Quality’ Really Mean?”, *Sloan Management Review*, Fall.
10. Gates, Bill (1999). *Business @ the Speed of Thought: Using a Digital Nervous System*, Warner Books.

11. Gruninger, M., Atefi, K., and Fox, M. S., (2000), "Ontologies to Support Process Integration in Enterprise Engineering", *Computational and Mathematical Organization Theory*, Vol. 6, No. 4, pp. 381-394.
12. Hammer, M (1990) "Reengineering work: don't automate, obliterate", *Harvard Business Review*, Vol. 68, No. 4, pp 104-112.
13. Hammer, M. (2001). "Process Management and the Future of Six Sigma", *Sloan Management Review*, Winter.
14. Hammer, M. and Champy, J. (1993). *Reengineering the corporation: a manifesto for business revolution*. Harper Business: NY.
15. Hammer, M. and Stanton, S. (1999). "How Process Enterprises Really Work", *Harvard Business Review*, Nov.-Dec.
16. Harrington, H. J. (1991). *Business Process Improvement*, McGraw-Hill: New York.
17. Hetzel, Robert L. (1984). *The Relevance of Adam Smith*, 1st edition - 5th Printing, Federal Reserve bank of Richmond.
18. Kalakota, Ravi. and Robinson, Marcia (2000). *e-Business 2.0: Roadmap for Success*, 2nd Ed., Addison Wesley.
19. Keen, P. and McDonald, M., (2000). *The eProcess Edge: Creating Customer Value and Business Wealth in the Internet Era*. McGraw-Hill.
20. Khalil, E. M. (1997). "Implications for the role of Information systems in Business Process Reengineering Environment", *Information Resources Management Journal*, Vol. 10, No. 1, pp. 36-43. 1997.
21. Klein, M. M. (1995). "Requirements for Successful Reengineering", *Infor*, Vol. 33, No. 4, pp. 225-233.
22. Ligus, R. G. (1993). "Methods to Help Reengineer Your Company for Improved Agility", *Industrial Engineering*, Vol. 25, No. 1, pp. 58-59.
23. McDaniel, Tyler (2001). "Ten Pillars of Business Process Management", *eAI Journal*, November.
24. Miller, G. (1995). "Reengineering: Forty useful hints", *Hospital Material Management Quarterly*, Vol. 17, No. 2, pp. 37-46.
25. Pirsig, R. M. (1974). *Zen and the Art of Motorcycle Maintenance*, New York, NY: Morrow.
26. Quinn, J. B., Baruch, J., and Zien, K. A. (1996). "Software-based innovation", *Sloan Management Review*, June.
27. Rayport, Jeffrey E. and Sviokla, John J. (1995). "Exploiting the Virtual Value Chain", *Harvard Business Review*, Nov.-Dec.
28. Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*, 5th edition, republished from: Edwin Cannan's annotated edition, 1904, Methuen & Co., Ltd.
29. Talwar, R. (1993). "Business Re-engineering-a Strategy-driven Approach", *Long Range Planning*, Vol. 26, No. 6, pp. 22-40.
30. Teng, James T.C., Jeong, Seung Ryul, and Grover, Varun (1998). "Profiling successful reengineering projects", *Communications of the ACM*, Vol. 41, No.6, June 1998.
31. Weill, Peter and Vitale, Michael R. (2001). *Place to Space*, HBS Press: Boston, MA.
32. Zinser, Stephan (1998). "Best practice in reengineering: a successful example of the Porsche research and development center", *Business Process Management Journal*, Vol. 4, No. 2, pp.154-167.