BUSINESS PROCESSING REENGINEERING

5.1 Methodology: ABSTRACT:

The methodology starts by defining the goals and objectives of the BPE project. Candidate business processes are identified. The selected strategic "As-Is" business processes are analyzed to find where problems exist. Several techniques are employed to engineer the "To-Be" process. The new process may be a radical departure from the old process. The alternatives are evaluated using cost/benefit analysis. The selected processes are then implemented using a phased approach that relies on information technology solutions along with the implementation of recommended organizational and cultural changes. A continuous improvement program is put into place to ensure long term success.

Having competitive processes has become as important (if not more) as having competitive products. Simply designing good products is not enough to gain competitive edge. Business processes have grown complex and fragmented in an ad-hoc manner. They span several departments and are very inefficient. Often the work being performed conflicts with the organizations' goals and strategic objectives. Traditional practices and policies tend to encourage this, resulting in being part of the problem instead of being part of the solution.

This section presents a model driven methodology for Business Process Engineering (BPE) to support an organization's migration to effective, agile and efficient processes. The essential elements of the methodology are process modeling, process analysis, and process execution by utilizing an array of information technologies. The methodology steps depend on process models for understanding, analyzing, simulating, improving, innovating and implementing the business processes.

"I have seen hundreds of organizations that by all rights should have crumbled under the inefficiency of their redundant, over-specialized, compartmentalized, costly business processes. There is only one reason they survive -- the same inefficiencies run rampant throughout their industry"
-- Thomas Koulopoulos

The quotation from Koulopoulos (1994) sounds harsh till one realizes that the actual working time in an average process is typically less than 1% of the total elapsed time. This is because business processes have grown complex and fragmented in an ad-hoc manner; They span several departments and are very inefficient. No one completely understands or is responsible for the whole process; everyone knows and takes care of their own little piece. Often the work being performed conflicts with the organizations' goals and strategic objectives.

Traditional practices and policies tend to encourage this, resulting in being part of the problem instead of being part of the solution. Such process inefficiency leaves a lot of room for improvement, and thus is receiving considerable attention in industry. This becomes significant if you ascribe to Thurow's (1992) prediction that, "In the twenty-first century there will be high-tech and low-tech products, but almost every product will be produced with high-tech processes."

Fine tuned and highly efficient customer-oriented processes are one of the key competitive advantages an organization can have in today's business environment. This paper describes an integrated suite of Business Process Engineering (BPE) tools and capabilities to support an organization’s migration to effective, agile and efficient processes.

A broad set of capabilities focused on modeling, simulation, cost/benefit analysis, optimization, workflow implementation, and information technology are required for a successful BPE effort. While there are several critical factors in successfully re-engineering processes, it is realized that information technology and workflow automation play a significant enabling role in making the re-engineered processes feasible and successful.

5.2 Understanding Business Process Engineering (BPE)

The fundamental thread in this discussion is accelerating change in the marketplace and the resulting need for continuous change in the way an organization thinks and operates. Tom Peters (1987) recognized this about a decade ago, and offered the following as the fundamental concepts for an organization to succeed:

- An obsession with the customer.
- Innovation to allow the enterprise to adapt to changes in the needs of the customer and the business environment.

- Full involvement of every-one in the organization to be the source of that innovation.

- Effective leadership with a vision that can focus and mobilize the organization towards a common mission.

- Common-sense systems designed to effectively meet the needs of the customer as efficiently as possible.

An organization can be viewed as a summation of its business processes. It is the effectiveness and agility of these processes that will determine how well an organization can satisfy the changing market.

Business Process Re-engineering (BPR) is one of the ways to address radical change. Hammer and Champy (1993) have defined BPR as the "fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance." Due to its very nature, BPR is a high risk venture. Information Technology is considered to be the primary enabling technology for BPR.

Business Process Improvement (BPI) on the other hand stresses continuous evolutionary improvements to the processes. Scope of a typical BPI project is narrower than that of a BPR project. BPI follows the Total Quality Management (TQM) philosophy. BPI projects are not risky, but the payback is also typically not very high.

BPI on the other hand is a necessity for any organization even after a successful BPR project. Without a sustained BPI program all the advantages gained could be quickly lost in today's dynamic business environment. These techniques should not be confused with the reorganization and restructuring efforts that have become common in industry.

BPR and BPI are complementary to each other, and both are valid and proven concepts. Typically an organization needs both. Business Process Engineering (BPE) embodies the characteristics of both BPR and BPI. BPE therefore supports both revolutionary and evolutionary changes. Business Process Engineering is a methodology that supports the evolutionary and revolution change that is required to achieve an organization's strategic goals through more effective, efficient, and agile business processes. BPE involves not only process changes but also organizational changes to support the new processes. There is a significant impact

on the policies and procedures of an organization. Teams are organized around processes rather than around organizational functions.

Teams are empowered to make more decisions as checks and controls are reduced. BPE leverages technology not just to make old processes better, but also to break the old paradigms. BPE involves the use of several tools.

Three key tools in the BPE life cycle are modeling, simulation, and implementation. One of the key tools involved in a BPE effort is process modeling. A model is a highly effective mechanism that answers questions about the processes or information that is being modeled. Some examples are the blueprint of a house or a CAD model of an aircraft.

Process modeling is a technique for collecting information and defining a process. We believe that modeling is critical and that if a process is not modeled, it cannot be fully understood, agreed upon by all involved, optimized, measured, or improved. Process model provides a communication vehicle for all the team members to come to a common understanding of the process. A data model is typically developed in conjunction with the process model to capture the business rules governing the objects that take part in the processes. This model should be developed at a very high level and should defer details to the implementation phase.

Another tool used in BPE is process simulation. Simulation provides graphical and analytical models of process behavior so that process constraints and workflows can be visualized and understood. Simulation uses the modeled processes and helps analyze their characteristics. The process models by themselves can offer a lot of insight into the process and uncover improvement opportunities. However, a lot of things are not intuitively obvious, and intuition does not always lead in the right direction. Simulation can overcome those deficiencies by providing quick answers to "what-if" questions. Simulation of processes also provides concrete metrics that form the foundations for cost/benefit analysis.

The third tool is Workflow Implementation. Implementation of the processes involves managing the workflow, managing the related information, and integrating various legacy systems using information technologies. A workflow tool automates and supports the work processes. One such tool is Intergraph's Design Methodology Manager (DMM). Workflow tools can consistently

enforce established business rules while allowing for controlled changes. A graphical workflow interface provides an enterprise view of the overall work and its status.

This visibility itself can motivate and improve productivity of the team members. The tool also keeps a log of all the work performed, thus providing a mechanism for continuous process improvement. These tools provide a means to consistently do work in a predefined manner, while allowing for changes. Workflow tools also provide mechanisms for ensuring that critical tasks are performed in the right order and can be used as "guiding experts" for new users.

There are several Information Technology (IT) components that support an implementation. Some of these are: Workflow automation, Distributed databases and computing, Document management, Imaging, Integrated messaging, Groupware, Knowledge Based Systems, Client server, Model-based product life-cycle, Virtual enterprise, Electronic commerce/EDI, etc.

The new processes need to be accompanied by new organizational policies and structure. This involves aligning organizational structure, human resource policies, training, etc. with the newly designed processes. This aspect of BPE is very critical for the success of the new processes.

5.3 The Scope

The BPE approach relies very heavily on the industry standard tools and methodologies and a carefully selected BPE team. The approach involves the following steps to **Determine the scope and objectives of the BPE effort (modeling, simulation, optimization, and workflow implementation activity).**

This is perhaps the most critical step as this bounds the scope of the problem to a manageable size that can be addressed in a reasonable amount of time to demonstrate results. The scope of BPE projects can vary significantly. Factors such as complexity of current business process, scope of problems to be addressed, understanding of current business processes, organizational policies and procedures, and the size and structure of an organization all play a significant role in determining the final scope and objectives of a BPE project. The BPE team should also be formed at this time. A "Big Bang" approach to BPE is not recommended. Significant results can be achieved through incremental development of well-defined projects, along the lines of key processes that demonstrate solid results.

It is also important to set clear objectives for the effort up front. The objectives and viewpoint need to be set for the modeling, simulation, and optimization tasks. The critical success factors need to be identified and risk analysis performed to complete the project plan.

The Candidate Strategic Processes To Be Re-Engineered - The identification and selection of candidate strategic processes to be re-engineered. Re-engineering a nonstrategic process will not provide the expected benefits and will probably be a waste of time. For an inexperienced BPE team it is advisable to identify a low risk/impact process for re-engineering.

Define and document the "As-Is" business process using the Process Modeling methodology This involves interviewing the people who are actually involved in and work on the process being modeled. Information about process steps, major objects involved, cost, resources, timing, business rules, policies, and constraints governing the process is collected.

The scope of this effort is to keep the model at a fairly high level. The process and data models are built and validated with user input. This is a critical step before defining the "To-Be" processes. The "As-Is" models capture the working knowledge that has been learned through years. These are lessons learned that will be critical for the success of the "To-Be" process. The "As-Is" model establishes a baseline for the BPE project. It provides a reference point as to where an organization is and sets the stage to define where it wants to be and it later provides the basis for defining the roadmap for achieving the desired state.

5.4 Developing a Simulation of the "As-Is" Model

Using the "As-Is" model, a simulation model is developed. This provides a rough validation of the process models and highlights any missing information. The simulation provides insight into the workings of the process and can highlight issues not intuitively obvious.

Simulation can graphically show bottlenecks, deadlocks, fragmentation, and haphazard routing. The reports generated can quantify throughput, cycle time, resource utilization, waiting times, etc. Desired metrics are collected and documented for the model. It is important to understand the objectives of the simulation upfront and to control the level of detail in the simulation.

Too much detail at this level can consume project resources and unnecessarily bog down the BPE effort. It is also very important to validate and analyze the results carefully. Simulation models can be abused, but can be extremely useful when utilized carefully. Good knowledge of statistical techniques and simulation principles is a must. The following diagram is a snapshot of the simulation model corresponding to the process model shown above. Typical information needed for simulation is process times, resources required, entity arrival rates, etc.

Validate the "As-Is" model and simulation

Validation is an ongoing part of the development of the process and simulation models. The "As-Is" model and the simulation model are validated with customer input. Any discrepancies are corrected and a baseline of processes and their metrics is established. Customer representatives, process experts, and simulation experts must be involved in the validation of the models and their results.

5.5 Develop the candidate "To-Be" Processes

The development of the "To-Be" processes can be done in different ways. This depends on a number of factors including risk, time frame, scope of the effort, etc. These processes are developed to achieve the goals and objectives outlined at the beginning of the effort. "To-Be" processes should be developed primarily by people currently involved with the "As-Is" processes and the customers of the process's output. Any improvement ideas and suggestions collected during initial interviews should be given careful consideration.

There are two main approaches --

Optimization of the "As-Is" business process by:

· Identification of any non-value added processes.

· Identification of any changes to the "As-Is" business process that can improve efficiency.

· Identification of technological innovations that can enhance the efficiency of the optimized workflow.

This is the evolutionary aspect of BPE. Typical tools used in the definition of the "To-Be" process are simulation, value chain analysis, brainstorming, root cause analysis, etc. This typically involves productivity improvement of particular process steps and better synchronization between various process steps. Any steps that can be executed in parallel are identified and reorganized to improve overall efficiency of the process.

Development of a new "To-Be" process from a clean slate by:

· Challenging all assumptions and constraints.
· Looking for new and innovative applications of technology.

This is the revolutionary aspect of BPE. There are a number of techniques (Brainstorming, Constraint/Assumption Breaking, Prioritizing, Root Cause Analysis, etc.) available to facilitate the development of the "To-Be" candidates. New and emerging technologies are evaluated for their potential to revolutionize the process. These techniques can also be utilized for "forward engineering" to design completely new processes where none existed before. This is also where the creativity and expertise of the BPE team are critical to ensure valid, workable processes are developed.

The focus is not on individual steps but the overall process and how it can be dramatically improved. The new processes are typically highly parallel and better focused. If significant legacy systems/databases are present that cannot be phased out immediately, a "Transition" process is defined that facilitates a smooth migration from the "As-Is" to the "To-Be" process while maintaining and upgrading the legacy systems and data. A good example is an organization with several million engineering drawings on aperture cards. These cannot be converted to electronic form overnight and they cannot be thrown away. Hence, a direct jump to the "To-Be" process is not practical.

The "Transition" process helps the organization migrate from an aperture card based "As-Is" process to a CAD model based "To-Be" process. The "To-Be" process will also require a "To-Be" organizational structure and policies. These must be carefully designed to support the new processes. This is typically where the organization, specially management, is most resistant to change.

Without corresponding changes here, the process changes may not produce the desired results. It is important to design new performance measures and reward schemes for employees that are aligned with the strategic objectives and processes of the organization. One of the critical changes is designation of a process owner who is responsible for the entire process. Simulation of the candidate "To-Be" processes Simulations of the "To-Be" and "Transition" models are done to validate the models' correctness and to collect metrics. This is an iterative step in conjunction with the previous step. These steps are carried out till acceptable "To-

Be" and "Transition" processes are defined that meet the objectives of the project. It is important to control the level of detail in the simulation models so as to meet the objectives of the BPE effort.

The simulation results should be carefully analyzed and validated by the BPE team and simulation experts. Simulation can be considered the very first prototype for the new process as it can provide an indication of how the process will behave.

Cost/ Benefits analysis

Cost/Benefits analysis can be performed for the "To-Be" and "Transition" candidates with respect to the "As-Is" baseline. Costs and quantifiable benefits are readily obtained from the process and simulation models. Qualitative benefits need to be determined by the BPE team in conjunction with the end user if possible. This analysis will help select and prioritize the new processes for implementation.

Implementation of the proposed process using workflow and application software and the integration with legacy systems and data as required

Implementation of the processes involves managing the workflow, managing the related information, and integrating various and legacy systems using information technologies. The workflow automation software executes the optimized processes and graphically depicts the execution sequence. The applications are integrated/ encapsulated behind the process steps. The workflow provides capabilities like automatic routing of work packages, enforcement of process steps, work tracking, approvals, etc.

System maintenance and continuous process improvement

Once the new process has been implemented and the users have been trained, the process needs to be maintained and continuously improved. Maintenance is important because the user requirements change over time and new requirements come up due to changes in the marketplace or technology.