A Task-Based Approach to Analyzing Processes

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Abstract

As much of corporate America has embraced business process reengineering, the Government Performance and Results Act of 1993 and the Department of Defense Corporate Information Management Initiative have provided the impetus for DoD to embrace the concept. DoD, and the Air Force in particular, have the advantage of being able to use a scientifically defendable and commonly used source of information, the occupational analysis data and analysis technologies already in development, to aid in their reengineering efforts. The Air Force occupational analysis program focuses on identifying discrete tasks which are then clustered into work units to be performed by specialists. The Occupational Measurement Squadron at Randolph Air Force Base in San Antonio, Texas, maintains occupational data associated with each of the 200+ 5-digit Air Force Specialties or career fields. Technologies currently under development by the Air Force, such as the Training Impact Decision System (TIDES) and Job Structuring Technology (JST), can be used to analyze the work units created from groupings of discrete tasks. Changes to or the creation of new groupings of tasks could be proposed and the results of the overall process examined, but these technologies could also be used to restructure entire specialties or career fields, or potentially even the entire career field system of the Air Force. Using these developing technologies, along with the occupational analysis data, could provide the Air Force and DoD with a tool for analyzing and seeing the potential effects of proposed process reengineering efforts.

Much of corporate America has embraced business process reengineering (BPR) to survive in today's competitive environment. The Department of Defense and the Air Force have begun to embrace this concept as well. In their book, *Reengineering the Corporation,* Michael Hammer and James Champy define reengineering as:

> "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed."

One legacy of modern business and the science that supports it is the division of work into simple, easily trained tasks or jobs; and the assignment of those tasks or jobs to specialties. Using this approach, the big picture -- satisfying the customer through delivery of quality products or services -- is sometimes lost. Specialists are each responsible for only their small portion of the work and lack the insight or motivation to adopt a larger view. Even managers do not always view the business as a process. When quality drops and customers are dissatisfied, managers often fail to consider the process; instead they focus on specific tasks in their search for origins of the problem. This focus limits the solutions they consider and the results they achieve.

Hammer and Champy identify "processes" as one of the key words in their definition. The old paradigm requires complex oversight processes to ensure that acceptable products result from the combined output of many simple tasks. It is these complex oversight processes that keep individual workers from understanding the big picture; they also provide managers inadequate control over the quality of the product. BPR seeks to replace complex processes with simple, flexible processes. Simplifying processes can also reduce costs by eliminating nonvalue-adding tasks and other inefficiencies.

Congress and the Department of Defense (DoD) have also embraced BPR. The Government Performance and Results Act (GPRA) of 1993 and the DoD Corporate Information Management (CIM) initiative have both provided motivation to improve business processes. The GPRA provides for the establishment of strategic planning and performance measurement in the Federal Government as techniques for improving the efficiency and effectiveness of government programs. In particular, a stated purpose of the GPRA is to "... improve Federal

program effectiveness and public accountability by promoting a new focus on results, service quality, and customer satisfaction." The GPRA requires all Federal agencies to submit, by September 30, 1997, strategic plans for their program activities. These plans must define the agency's mission and state measurable goals and objectives for achieving their mission "... including a description of the operational processes, skills and technology, and the human capital, information, and other resources required to meet those goals and objectives."

CIM requires the Services to reengineer business processes of functional areas such as personnel and logistics before they are allowed to invest in new information technology. CIM uses facilitated subject matter expert (SME) workshops with representatives from the functional area to design the future, or TO-BE, activities that form the new business processes. Initiatives are identified to move the functional area closer to the reengineered processes. These initiatives often include the insertion of new information technology. Functional economic analysis is then used to compare initiatives and to develop a business case for deciding which initiative to select for funding. The business case typically requires that the initiative pay for itself over some planning horizon. The Air Force has been involved in a number of joint CIM efforts and has also initiated several of its own.

One of the results of BPR is to redefine the way work is organized. Hammer and Champy identify several recurring themes in the new processes: (1) Previously distinct jobs are combined into one, compressing processes horizontally by having the teams perform several, sequential tasks; (2) Processes are also compressed vertically by allowing the workers or teams of workers to make decisions that formerly were made by management -- decision making becomes part of the process; (3) The steps in the process are performed in a natural order, not in an order dictated by the old, complex process, thus removing artificial precedence relationships and allowing more tasks to be performed simultaneously; (4) Processes are more flexible and less standardized; (5) More work is accomplished across organizational boundaries, reducing reliance on specialists; (6) More emphasis on cross-functional teams, sometimes called Integrated Product Teams (IPTs) which bring together specialists from several disciplines to produce a particular product; and (7) Nonvalue-added tasks are eliminated. This includes minimizing reconciliation and reducing checks and controls to only those that make economic sense. By sharing databases and reducing the number of data input points, the need for reconciling data is reduced.

Occupational Analysis Data

The Air Force occupational analysis program supports a traditional approach to performing business processes wherein discrete tasks are clustered into work units to be performed by specialists (Christal, 1974). As noted above, this approach often results in workers and managers who do not have the big picture of the product being produced or the service being performed. The ongoing occupational analysis program tends to make marginal changes to occupational clusters. Changes may indeed produce improvements in performance and use of resources, but the narrow focus on making minor changes to the existing AFS starting points produces only limited solutions to problems and potentially fails to address larger scope process improvements.

To fully reap the benefits of reengineering, the Air Force would need to modify or redesign its occupational analysis program to support the larger scope business processes. Reengineering seeks to simplify processes that have grown complex through evolution. Critical examination of processes often reveals components that are no longer producing added value or reveal components that can be simplified through technology. By first examining and reengineering the underlying business processes, the rich data from occupational analysis can be more effectively used to structure jobs.

The methodology for this modification/redesign follows a similar approach to the present methodology used by the Air Force for collecting occupational analysis data. The development process begins with the identification of the task inventory list for the process. The Occupational Measurement Squadron (OMSq) at Randolph Air Force Base in San Antonio, Texas maintains task lists associated with each of the 200+5-digit Air Force specialties (AFSs) or career fields. In addition to the tasks lists, OMSq maintains information concerning characteristics of each of the tasks such as task learning difficulty (TD), percent members performing the task PMP), relative percent time spent (PTS), training emphasis, etc. This information can be used to assess the effect of reengineering on requirements for training, aptitude, manning, etc.

AFS to Process Conversion

Technology has been developed, such as the Training Impact Decision System (TIDES), which demonstrates the ability to define jobs within career fields, as well as career fields, and training courses as a combination of tasks or task modules (Gosc, Mitchell, Knight, Stone, Reuter, Smith, Bennett, & Bennett, 1995). A task module (TM) is a group of tasks which are naturally performed or trained together in such a way as to take advantage of coperformance or co-training. These TMs are then used to define the jobs within a career field. The manning requirements imposed upon these jobs, and the TMs of which they are comprised, form the basis for the demand

for training on these TMs.

In the same way in which a career field is defined as a combination of jobs which are a collection of TMs, a process can also be defined in terms of jobs which must be performed and the TMs which comprise those jobs. For example, Hammer and Champy define a business process as a collection of activities (tasks or TMs) that takes one or more kinds of inputs and creates an output that is of value to the customer. The information compiled through the development of task lists can be redirected from career fields and career field training to processes and the jobs which are required to perform the processes.

Air Force training has always been oriented towards career fields; however, much of Army training is oriented towards units. For example, the nature of ground combat requires crews to be cross trained to fill in for each other and that equipment operators also be maintainers. The crew members are all cross trained for positions other than their own. Tank crew, howitzer crew, etc., perform first level maintenance on their equipment in the field. They accompany the equipment to second level maintenance and assist with the maintenance. Even ambulance crews are trained in vehicle maintenance. Thus, the Army defines training and jobs by units which perform specific tasks, task modules, or processes. For much of the Army, processes are already defined by a task list and Army occupational analysts can take advantage of the information which a well defined task list can render.

Air Force processes can be a combination of jobs which presently reside within several career fields (specialties) or within a single career field (specialty). If the jobs associated with the performance of a particular process all reside within the same career field, many of the advantages of a task (TM)-based approach to defining the process are minimized, e.g., the skill and knowledge requirements may be the same for the career field as for the process.

When the jobs which comprise a process are drawn from jobs across several career fields, some advantages can be gained in analyzing the reengineering of the process through a task (TM)-based approach. Tasks and TMs can be mapped to skill and knowledge requirements which can be used to identify training requirements (Moon, Driskill, Weissmuller, Strayer, Fisher, & Kirsh, 1991). Using tasks or TMs to define processes provides the basis for identifying skill and knowledge requirements and, thus, training needs which are directly tied to the process. Defining and constructing training courses based on process requirements may take advantage of a more natural, work-oriented order of performing tasks (TMs) and, thus, introduce larger economies of co-training and coperformance which are neglected or ignored when the focus is on career field requirements.

One of the keys to mapping TMs/tasks to processes will be to identify the TMs/tasks which comprise the process. Since this methodology does not exist, several alternatives will be discussed. One such alternative would be to assemble SMEs to identify, from a master TM/task list, those TMs/tasks which comprise the process. This is similar to the methodology which OMSq presently uses when updating or initiating a new AFS study, i.e., providing a task list to SMEs to identify the appropriate list of tasks active for a career field. The question is how to identify a beginning TM/task list which does not encompass the total task list across career fields.

One proposed methodology for accomplishing a reduction in the task list to a manageable level for review by SMEs is by using the Uniform Airman Report (UAR) to identify jobs and, thus, TMs/tasks associated with those jobs which are a part of performing the process. Several data elements from the UAR would be reviewed as candidates for assembling the original TM/task list. Data elements contained in the UAR such as functional account codes, location (organization/base/unit), job description, etc., could provide a basis for the identification of jobs or activities associated with processes. Either one or a combination of these data elements will be reviewed to determine the best approach for identifying the original task list, and, thus, the TMs/tasks associated with the process.

Once the data element (or combination of data elements) has been used to identify individuals involved in the performance of the process, the individuals can then be mapped to Occupational Survey (OS) data. The tasks which these individuals have identified as the ones they perform in the respective jobs will form the basis for the original process task list to be reviewed and refined by SMEs.

Once the process task list has been refined by SMEs, then the OS data provides an extensive amount of information which can be used to analyze process reengineering alternatives from numerous perspectives. For example, relative time spent performing tasks can be used to identify time intensive tasks which could be identified for process reengineering and/or technology improvements. Alternatives for restructuring of processes can be reviewed from numerous perspectives such as training requirements, knowledge and skill requirements, aptitude requirements, etc.

Technologies currently under development by the Air Force, such as TIDES and Job Structuring Technology (JST), can be used as a tool to evaluate the effects of proposed restructuring. JST can be used to assist SMEs in the identification of tasks and TMs that can be combined into processes. These new processes, or groupings of tasks, can then be evaluated using TIDES to determine their impact on training requirements, training costs and mission readiness. TIDES could be used to evaluate any level of change to an Air Force career field, from changing a single process within a career field, to reengineering an entire career field, to finally restructuring and reengineering the entire Air Force career field structure. Comparing the training requirements and costs under the reengineered system with the existing system as determined by TIDES would provide an estimate of the anticipated costs or savings of the reengineering effort. TIDES would provide an important tool for the Air Force to assess the feasibility of any proposed process reengineering effort before implementing the new system.

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E. Distribution Statement A: Approved for Public Release

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