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Web-Based Job Analysis & Usability Best Practices

Introduction

In the rapidly evolving world of work, jobs are in a state of constant flux due to emerging technologies and other systematic changes. Workers are also changing as the need for specialization moves towards preferences for cross-functional workers. In short, jobs and workers have become less specialized – one job may serve the functions of two or three previous jobs and the need for depth of expertise has been replaced by a need for breadth of knowledge among workers. As a result of these changes, it is increasingly crucial for organizations to understand its jobs and employees. Job analysis provides an essential tool for organizations to meet the demands of an ever-changing marketplace, and serves as the foundation upon which human resource management interventions are built (Veres, Locklear, Sims & Prewett, 1996). However, the quality of the job analysis ultimately determines the utility of human resource management applications based on that information.

What is Job Analysis?

Job analysis information serves a variety of human resource management applications in organizations (Gatewood & Field, 2001). In these contexts, “job analysis” refers to:

The collection of data describing observable, or otherwise verifiable, job behaviors performed by workers, including what is accomplished as well as what technologies are employed to accomplish end results, and characteristics of the job environment with which workers interact, including physical, mechanical, social, and informational elements (Dunnette & Hough, 1990; Harvey, 1994).

In general, job analysis is a systematic procedure used to describe important aspects of the work and the worker. This purpose has not substantially changed since 1922, when Morris Viteles first used his “job psychograph” questionnaire to help select employees (Landy & Conte, 2004). However, since then several general approaches to job analysis have been developed. These general approaches to job analysis include the following:

- **Work-Oriented vs. Worker-Oriented Approaches.** Work-oriented approaches to job analysis describe work in technological and behaviorally explicit terms. Using these methods, analysts describe work in terms of tasks, the most specific level of job behavior describing performance of a meaningful job function. Each task refers to a specific action being applied to a specific object, and must be observable, have a definite beginning and end, and result in a completed work action or measurable product (Gael, 1990a). In contrast, worker-oriented approaches to job analysis describe general human behaviors involved in job performance rather than describing tasks themselves. The basic idea behind worker-oriented job analysis is that all jobs can be described using a relatively small number of Generalized Work Activities (GWAs), and by using these GWAs, even dissimilar jobs can be compared.
- **Inductive vs. Deductive Approaches.** Inductive approaches rely on the collection of new, specific information about the job. After collecting this information, the analyst creates a structured description of the job. Although this type of analysis provides more detailed information than other approaches, inductive job analyses are costly and do not generalize to similar jobs in other organizations. Deductive approaches, on the other

hand, are based on the use of existing information such as previous job analysis data, job descriptions, training materials, and other sources. This information can then be modified to better fit the job as it currently exists, and surveyed to gather data on work context, task frequency and importance, and training time. Deductive approaches are less costly than inductive approaches and result in general job descriptions that can potentially be used in similar jobs in other organizations (Peterson & Jeanneret, 1997).

- **Top-Down vs. Bottom-Up Approaches.** Top-down approaches are based on rule-based cognitive models and theoretical approaches. Using this approach, the analyst identifies important organizational outcomes and infers what attributes are required to accomplish results. On the other hand, bottom-up approaches describe behavior driven by incoming information. Using this approach, the analyst identifies the work and worker job elements and makes logical inferences about attributes needed for successful job performance.

Given its importance in helping organizations make strategic human resource management decisions, it should come as no surprise that many different job analysis approaches have been developed. While each of these approaches is distinct, the underlying processes behind them remain relatively similar. Specifically, standard job analysis should usually involve 1) gathering relevant job information from available documentation, 2) meeting with job incumbents to define their perceptions of the job, 3) identifying important job dimensions, 4) observing or otherwise gathering information about the job, and 5) developing measures to assess various aspects of the job (Ash, Levine & Bennett, 1980). Regardless of the approach chosen, however, job analysis is not just required to make human resource management decisions – it's the law.

Legal Precedents for Job Analysis

The legal context of human resource management has played a major role in establishing the demand for job analysis. This legal impetus can be thought of as occurring in two “waves” of legislation and in a few significant U.S. Supreme Court decisions. The first wave of legislation occurred during the 1960s. From this wave, three Acts of Congress bear discussion:

- **The Equal Pay Act (1963).** This Act, associated with the Fair Labor Standards Act (FLSA), outlawed unequal pay for “substantially equal work in skill, effort, responsibility, or work conditions.” However, this act only considered gender in its scope of protection.
- **The Civil Rights Act (1964).** This Act, particularly Title VII, represents the most comprehensive Equal Employment Opportunity (EEO) legislation passed to date. The Civil Rights Act prohibits discrimination of terms, conditions, and privileges of employment based on race, color, sex, religion, or national origin. Protection is also offered against segregation, classification, and retaliation on the part of employers. An organization’s failure to adhere to these provisions may result in *disparate treatment* or *adverse impact* on protected group members. As a part of this legislation, The Equal Employment Opportunity Commission (EEOC) was established to enforce Title VII laws (Gatewood & Field, 2001).
- **The Age Discrimination in Employment Act (1967).** The third significant legislation included in the first wave protects individuals 40 years of age or older from employment discrimination. Building on the earlier Civil Rights Act, this legislation also includes protection under Title VII.

Although significant gains were made during the 1960s, additional legislation was needed to further protect individuals from discriminatory employment decisions. As such, the second wave of legislation, occurring during the 1990s, further impacted the need for organizations to conduct thorough job analysis. In this era, two additional Acts of Congress bear discussion:

- **The Americans with Disabilities Act (1990).** This Act addresses employment discrimination based on physical and mental disabilities. Specifically, the ADA protects disabled individuals who can perform essential job functions and requires employers to make “reasonable accommodations (e.g., widening doors for wheelchairs, large font computer screens, aids for the hearing impaired).”
- **The Civil Rights Act (1991).** This Act impacted employment decisions by protecting against discrimination of gender, national origin, race, or religion. For the first time, this Act provided monetary damages to compensate victims of intentional job discrimination and deter future wrongdoing.

These five legislative actions require that employment decisions discriminate individuals based only on job dimensions, but do not define job analysis as the means by which this link is established. However, building on the earlier wave of legislation, a number of significant cases were brought before the U.S. Supreme Court. Taken together, these cases explicitly define job analysis as the means by which employers must prove the relationship between human resource management decisions and job dimensions. Two significant cases are described here:

- ***Griggs v Duke Power (1971)*.** In this case, the court placed the burden of responsibility for defending selection procedures and resulting decisions on the employer. Specifically, in the event of a discrimination allegation in selection or promotion, the employer must prove the job-relatedness of the procedures and resulting decisions. Thus, ***Griggs*** implies that job analysis represents an important legal component in the validation of selection procedures.
- ***Albemarle Paper Co. v Moody (1975)*.** In this benchmark case, the court openly criticized the organization’s failure to conduct a thorough job analysis in a validation study. The case reaffirmed the idea that any test used in selection or promotion must be validated, especially when its use may adversely impact protected group members. The lack of job analysis played a pivotal role in the outcome of the case, and the burden of conducting job analysis was expressly placed on organizations.

In later reviews of employment-related discrimination complaints, it has been found that organizations conducting thorough job analyses using specific instruments tend to survive legal attacks (Field & Holley, 1982). In fact, job analysis is typically regarded as the best way for an organization to defend its human resource management practices against legal challenge (Guttman, 2000). However, it is not just the inclusion, but rather the quality of the job analysis that ultimately determines how well an organization can defend itself. In general, the following characteristics increase the legal defensibility of the job analysis:

- **Multiple Sources.** Data should be collected from multiple sources to prevent potential biases from a single source (Gatewood & Field, 2001).
- **Multiple Methods.** Using multiple methods allows for convergence of results and makes the job analysis more comprehensive (Brumback, Romashko, Hahn & Fleishman, 1974)
- **Trained Analysts.** Trained job analysts ensure that proper methods and procedures are used in the collection and analysis of job information.
- **Documentation.** All processes and procedures used in the job analysis should be recorded in detail for auditing purposes (Thompson & Thompson, 1982).

- **Representative Sample.** The sample of Subject Matter Experts (SMEs) chosen for the job should be of appropriate size and representative of all demographic job characteristics (Gatewood & Field, 2001).
- **Reliability.** The processes and procedures chosen for the job analysis should produce consistent and dependable results (Gatewood & Field, 2001).
- **Validity.** Job analysis information must accurately reflect job dimensions and be related to successful performance. This ensures that human resource management decisions based on this information distinguish individuals based on job dimensions (Gatewood & Field, 2001).

In order to enforce these benchmarks of legislation and court action, several guidelines have been issued by federal agencies and professional organizations. These standards ensure that job analysis adheres to the seven key characteristics listed above. Specifically, the Equal Employment Opportunity Commission (EEOC), in collaboration with the Civil Service Commission, the Department of Labor, and the Department of Justice, issued the *Uniform Guidelines on Employee Selection Procedures* in 1978. These guidelines describe the evidence considered in discrimination cases and how organizations can defend their human resource management practices. As expected, job analysis remains the most important process the organization can undertake to defend itself against such claims.

Building on the *Uniform Guidelines*, similar standards for making employment decisions have been issued by other organizations. Specifically, *The Standards for Educational and Psychological Testing* was published by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education in 1985. Similarly, *The Principles for the Validation and Use of Personnel Selection Procedures* was published by the Society for Industrial and Organizational Psychology in 1987. As expected, these guidelines emphasize job analysis as the means by which organizations can best defend their human resource management practices (Knapp & Knapp, 1995).

Taken as a whole, the above sequence details the legal requirement for job analysis as the foundation of all human resource management decisions. Congress took the first step in this sequence by requiring that employment processes and decisions discriminate employees based only on job-relevant dimensions. The courts took the next step by defining job analysis as the means by which the relationship between job dimensions and personnel processes is proven. Finally, federal guidelines and professional standards ensure that job analysis follows strict rules to protect the integrity of information used to make downstream human resource management decisions. However, job analysis offers much more to organizations than protection from legal challenge. Specifically, this information facilitates well-informed employment decisions across a number of human resource management applications. These informed personnel decisions, in turn, may increase overall organizational performance.

Human Resource Management Applications for Job Analysis Information

Across the spectrum of human resource management applications, from recruitment and selection to turnover and organizational change, job analysis information can assist organizations in making educated decisions and increasing performance. As most traditional job analysis techniques are appropriate only for certain uses, the method chosen by organizations and analysts alike typically depends on how the information will likely be applied (Cascio, 1987). Some of the typical applications of job analysis information are listed here:

- **Job Advertising & Recruitment.** Job advertisers and recruiters both profit from worker information provided by job analysis. Job analysis information informs recruiters about knowledge, skills, abilities, and other experiences to look for in individuals likely to

succeed in the job. Recruiters can use these insights to pre-screen those individuals who may lack the required attributes to succeed in the job.

- **Selection and Promotion.** Job analysis information is instrumental in identifying predictors of successful job performance. Conducting job analysis can help organizations define the work to be performed on the job, as well as the knowledge, skills and abilities required by selected applicants. This information allows the organization to define performance standards and related criteria to determine eligibility for selection or promotion (Schmitt & Chan, 1998; Gatewood & Field, 2001; Berry, 2003).
- **Job Specification & Design.** Job specifications are one basic product of job analysis, summarizing overall worker requirements for the job. In job design, specifying how the job is performed includes tasks performed by employees and the attributes required to perform those tasks. Job analysis information informs both of these aspects of human resource management.
- **Organizational Change & Redesign.** In organizational change, job analysis information can be used to maximize efficiencies and minimize redundancies in the acquisition and use of financial, material, personnel, or time resources. Job analysis information assists this process by specifying requirements and responsibilities for each job (Cascio, 2003). This information can also be used to identify obsolete functions or those to be enhanced to meet demands of significant change initiatives.
- **Job Description.** Another product of job analysis is a description that summarizes the job's overall requirements including major responsibilities and ongoing functions (Cascio, 2003). The job description also explains tasks the employee is expected to perform in the job. Third, job descriptions identify common features of each job to facilitate comparisons and estimate their strategic place in the organization.
- **Job Classification & Career Banding.** To the extent that job classification and career banding efforts are guided by similarities and differences in work or worker characteristics, job analysis information is vital. In some organizations, jobs that are sufficiently similar are grouped together in job families and career bands. This process offers a number of advantages in promotion, compensation, and workforce development efforts.
- **Job Evaluation.** Job evaluation efforts typically result in rank-ordered lists of jobs according to their strategic worth to the organization. This process is driven by identification of job characteristics (or compensable factors) for which the organization is willing to pay. Job analysis is crucial in identifying these compensable factors. Using this information, the organization may set equitable pay rates for its employees (Cascio, 2003).
- **Career Planning.** In these applications, job analysis information illustrates varying levels of specific job characteristics in current and future jobs along a career progression. Additionally, organizations may identify the knowledge, skills, and abilities available in the workforce to fill current or planned vacancies. If these assets are not available, the organization can prepare accordingly.
- **Competency-Based Compensation Systems.** Successful efforts to adopt competency-based compensation systems rely heavily on the identification of the knowledge, skills, abilities, and other worker attributes required to successfully perform a number of different jobs (Cascio, 2003). Clearly, job analysis information is crucial in this application.

- **Personnel Requirements.** Job analysis often used to identify personnel requirements. In turn, personnel requirements may be used to determine competencies needed to perform the job (Cascio, 1998). Using job analysis to summarize personnel requirements is important for communicating the nature of the job to employees and those less familiar with the job (Brannick & Levine, 2002).
- **Performance Appraisal.** Job analysis information helps define content to be included in performance appraisals. This information facilitates specific, job-relevant performance appraisals more widely accepted by employees, organizations, and courts (Latham & Wexley, 1993; Condrey, 1998). Job analysis information can also be included in performance appraisals to help determine performance domains where employees might require further training and development.
- **Training & Development.** Job analysis information identifies relevant job content to be included in training programs by determining critical performance domains (Condrey, 1998). Those performance domains typically become the focus of training initiatives (Muchinsky, 2003). Critical performance domains may also be referenced against employee attributes to determine where training is needed to fill gaps (Spector, 1996).
- **Personnel Transportability.** Job analysis can be used to determine relationships between jobs and prepare employees for transitions within the organization (Condrey, 1998). When studying personnel transportability, job analysis surveys collect data on large clusters of jobs in an organization. These data are analyzed to determine which skill sets transfer easily between jobs (Brannick & Levine, 2002). Without this information, employees may be moved into jobs for which their skill set is misaligned.
- **Efficiency.** Job analysis information helps organizations increase efficiency by determining more efficient ways to perform a job. For example, methods may be used to observe and critique performance of employees working in production and assembly jobs (Brannick & Levine, 2002). Other methods may focus on employee interactions with machines, tools, and other equipment in performing tasks. This information allows analysts to determine where jobs may be changed to increase efficiency.
- **Work Safety.** Job analysis information may also uncover safety concerns to be addressed to increase workplace safety or decrease the frequency of accidents. Job analysis may be used to develop job aids or sequences that enhance employee safety (Brannick & Levine, 2002). Studying job tasks, equipment and tools, required knowledge, skills, and abilities, and work processes allows analysts to take measures to optimize workplace safety (Landy & Trumbo, 1980).
- **Workforce Planning.** Workforce planning initiatives use job analysis information to determine current workforce skill sets as well as skills needed for the future. With information about job requirements and worker attributes, organizations can plan for the work itself and employees best-suited to perform the work in the future. Although attention is typically given to job tasks, an equally important descriptor concerns the knowledge, skills, and abilities required by workers to perform those tasks (Brannick & Levine, 2002).
- **Mergers & Acquisitions.** Job analysis plays an important role in helping organizations reduce ambiguities and confusion imposed by mergers and acquisitions. In this context, job analysis information provides insight about current organizational resources and needs to be filled to meet performance expectations. With these insights, the newly structured organization may reach its financial and strategic objectives with a clear understanding of the new roles and responsibilities for employees (Muchinsky, 2003).

- **Strategic Capacity Planning.** Strategic capacity planning involves assessing current workforce capacities, determining future goals, and planning to leverage workforce capacities to reach those goals (Cascio, 1998; Chauhan, Nagi & Proth, 2004). Job analysis provides information on resources and attributes currently in place, facilitating a better understanding of current frameworks and future needs. This alignment empowers the organization to address its future needs to reach strategic goals.

As these examples illustrate, job analysis information serves significant organizational ends beyond meeting legal requirements. In fact, the full range of human resource management functions is fueled by information obtained through comprehensive job analysis. However, a number of specific techniques have been developed for conducting job analysis, and each of these methods focus to varying degrees on either the work or the worker. As such, most traditional job analysis techniques are designed to serve only certain human resource management applications. These techniques are discussed below.

Job Analysis in Practice

Considering the legal impetus and human resource management applications described above, the need to perform a thorough job analysis is undoubtedly important. However, little agreement exists on the best approach organizations should take when conducting job analyses. Over the past 60 years, Industrial-Organizational Psychologists and Human Resource Management professionals have taken several different approaches to job analysis with varying levels of success. Considering the advantages and disadvantages of each technique, the SkillsNET® method discussed shortly integrates the best features of prior approaches to job analysis. This innovative approach enables organizations to efficiently collect job analysis data and apply it across the spectrum of Human Resource Management applications. Descriptions of traditional job analysis techniques incorporated into the SkillsNET method are given below:

- **Documentation.** Documentation of existing information from previous job analysis, job descriptions, performance evaluations, work logs, and training and equipment manuals usually serves as the starting point for job analysis. Using existing documentation lowers the cost of the job analysis and allows for inclusion of previously-validated information. However, job analysis should not rely solely on existing information because it is unlikely that prior information is current and valid. In general, initial documentation should be collected from recent sources and the job data then analyzed by job incumbents.
- **Observation.** In this method, the analyst watches the employee perform the work and simultaneously interviews them. This information may be used to develop job descriptions, performance evaluations, or training manuals. With observation, the job analysis gains acceptance and credibility among job incumbents and supervisors. However, observation is not suitable for all jobs, such as those requiring a great deal of cognitive activity. Additionally, this method may require a significant period of time, and the presence of an observer may affect the incumbent's work behaviors.
- **Interviews.** In addition to or in place of observation, job analysis can be conducted by interviewing Subject Matter Experts (SMEs). Interviews are used in many job analysis methods, but are most effective when collecting information about the work (Gael 1990b; Brannick & Levine, 2002). While a large amount of information may be collected from interviews, the job incumbent may fear evaluation of their performance rather than collection of job information. As a result, the analyst must take care to explain the purpose of the interview and how the information will be used.

- **Ability Requirement Scales (ARS).** This method evaluates the characteristics the worker must have to perform the job (Fleishman & Mumford, 1988), focusing on a standardized list of 52 abilities categorized as cognitive, psychomotor, physical, or sensory/perceptual. The ARS method provides limited knowledge, skill, or task data for a given position, but is easy to administer at a low cost (Fleishman & Mumford, 1989).
- **Position Analysis Questionnaire (PAQ).** This method utilizes a structured questionnaire that assumes commonality across jobs (McCormick, 1976) and offers a broad explanation of necessary job behaviors. The PAQ may be used across a wide range of jobs as well as across time even though tasks, technologies and duties may change. The PAQ is more worker-oriented than other methods because it focuses on individual performance necessities involved in job behavior. The PAQ is standardized, facilitating direct comparisons of work elements across jobs, and requires a relatively brief period of time to complete. However, the PAQ has been criticized for its high required reading level and its lack of job-specific information, limiting its use across human resource management functions.
- **Critical Incident Technique.** This work-oriented method is used to analyze job content by asking Subject Matter Experts (SMEs) to recall specific instances of exceptional or unacceptable work behavior. Three requirements of a critical incident include 1) the context that led to the behavior, 2) the behavior itself, and 3) the consequences of the behavior (Wagner, 1951; Flanagan, 1954; Bownas & Bernardin, 1988; Brannick & Levine, 2002). This approach has high versatility in its use, but is most frequently used in performance appraisal, training design, and selection. Critical incidents provide a great deal of job information and are effective in differentiating exceptional from poor performance. However, this technique does not include standardized information about worker knowledge, skills, and abilities.
- **Functional Job Analysis (FJA).** Functional Job Analysis (FJA) is a structured process that involves analysis of the worker, the work, and the worksite through interviews (Fine, 1989). This technique provides two forms of information: 1) the procedures used as the job is being performed, and 2) the physical, mental or interpersonal contributions of the worker. Using this method, task statements are developed through documentation and panel discussions. This method can be applied in job description, selection, reasonable accommodation, job and training design, and performance appraisal. FJA is attractive because it produces standardized task statements and describes job content and context. However, this method is time-consuming and costly, and does not produce any information on worker knowledge, skills, and abilities.
- **Task Inventories.** Task inventories begin by interviewing SMEs to identify activities required to perform a job. Additionally, the analyst may collect information from preexisting documentation that may assist in identifying job tasks. Once task statements are created and classified into job duties, SMEs are surveyed to gain more information about the job (Sanchez & Levine, 1989). The survey prompts respondents to rate tasks using scales such as degree of involvement, time spent on the task, task importance, criticality, or difficulty to learn. While this method provides good task information, it does not produce standardized information about worker knowledge, skills, and abilities.

Although each of the approaches described above has utility in specific human resource management applications, no single approach has found wide usage across a number of diverse applications. Largely, this limitation stems from the fact that these prior approaches gather information only about what work is performed on the job (e.g., tasks) or the attributes (e.g., knowledge, skills, and abilities) workers need to successfully perform the job. However, none of these techniques combined both inductive and deductive approaches to capture information about the work and the worker. This began to change in the mid-1990s when the U.S. Department of Labor developed the Occupational Information Network, or O*NET. This system would become

the new national standard for describing occupational work, and plays a significant role in the SkillsNET method of job analysis.

The Occupational Information Network (O*NET): Combining the Approaches

Designed to replace the Dictionary of Occupational Titles (DOT), O*NET uses multiple standardized descriptors to provide both work- and worker-oriented “windows” into the world of work, a common language for describing different jobs, and an efficient taxonomy to classify job information (Dye & Silver, 1999). The six broad content areas of the O*NET model include both work- and worker-oriented approaches for collecting job analysis information (Campion, Morgeson & Mayfield, 1999; Mumford & Peterson, 1999). Work-oriented information is found in occupational requirements (e.g., Generalized Work Activities, work context, organizational context), occupation-specific requirements (occupational skills, knowledge, tasks, duties, machines and equipment), and occupation characteristics (e.g., labor market information, occupational outlook, wages) domains. Likewise, worker-oriented information is found in experience requirements (e.g., training, experience, licensures), worker requirements (e.g., skills, knowledge, education), and worker characteristics (e.g., abilities, occupational values and interests, work styles) domains (Peterson, Mumford, Borman, Jeanneret & Fleishman, 1999; Peterson et al., 2001).

Taken as a whole, O*NET represents one of the most comprehensive approaches to job analysis offered to date. By collecting information about both the work and the worker, this system provides a rich database of information that analysts may use as a starting point for conducting job analysis (Peterson et al., 2001). However, to ensure that its information applies across many different organizations, O*NET uses very broad and general descriptors about work and workers. In addition, as this system relies on task information to describe work, O*NET’s tasks must be continually updated to account for fast-paced technological and other changes that render previous job content obsolete. Therefore, although O*NET provides a comprehensive starting point, it does not replace the need for organizations to conduct thorough job analysis to make strategic human resource management decisions.

Taken as a whole, many different approaches have been developed for conducting a formal and systematic job analysis. These approaches may focus on either the work or the worker, and may be based either on the inductive collection of new job information or deduced from previously collected information. O*NET provides a promising alternative by combining both inductive and deductive approaches to capture both work- and worker-oriented information. However, even with the advent of O*NET, traditional job analysis techniques still suffer from a number of problems. A few of these issues are listed below:

- **Speed of Obsolescence.** When the basic units of a job change, information for that job must be updated. Using traditional job analysis techniques, tasks represent the basic unit of information. However, in the increasingly rapid world of work, job tasks are continually changing to meet updated technologies, organizational structure, and other demand signals. When these changes occur, prior task-centric information becomes obsolete quickly, and new job analysis must be conducted to update job information.
- **Rigor.** Because jobs are dynamic, job analysis information cannot be viewed as static or permanent. Rather, continuous revisions are needed to update previous job analyses. Under most circumstances, this requires that completely new job analyses be conducted each time significant changes (e.g., technological changes, increased or decreased responsibilities) occur within the job.
- **Rigidity.** Another limitation of traditional techniques is their rigidity to the unique needs of various organizations. Specifically, these methods typically use a single point of input (e.g., job incumbents or supervisors) and lack systems of checks and balances as well as

flexibility to the demands of specific jobs (e.g., personnel working from remote locations). In addition, these techniques are typically chosen to meet short-term needs of a specific human resource management application rather than a strategic, long-term approach to accomplishing multiple organizational goals.

- **Resource Needs.** Almost regardless of technique, traditional job analysis requires significant investment by the organization. Specifically, numerous personnel may be taken away from their work to provide input into the job analysis process. In addition, the process itself may take months (or in some cases over a year) to complete. These requirements make traditional job analysis extremely resource intensive in terms of the organization's time, personnel, materials, and finances.

Based on these limitations, it is clear that a new and innovative job analysis technique is needed that capitalizes on the strengths of O*NET and other traditional approaches while avoiding the typical pitfalls of occupational study (Sanchez & Levine, 1999). As O*NET represents the national standard for describing work, this system should be incorporated to provide a crosswalk to the Department of Labor's rich database of job data. Working in close collaboration with some of the original developers of the O*NET model, SkillsNET has developed just such a system in its web-based SkillObject Designer[®] application. This ground-breaking job analysis technique starts with a new basic unit of job information – the SkillObject[®].

SkillsNET's Revolution in Job Analysis: The SkillObject

The SkillObject represents a proven alternative unit of job information to task- and competency-based job analysis techniques. Using task-based job analysis methods, jobs may contain anywhere from one to two hundred tasks, each becoming obsolete with increasing speed as technology and other aspects of work evolve. However, tasks still remain the most specific level of meaningful job behavior. On the other hand, using competency-based job analysis, analysts find jobs comprising just a handful of very broadly defined competencies. Although useful for making comparisons across jobs, these competencies lack flexibility for application in making a number of diverse personnel decisions at the job level. Nevertheless, because of their applicability in making cross-job comparisons, the world of work is moving towards the efficiency of broader competency models. Based on these observations, it is clear that what is needed is a bridge between the granular nature of tasks and the broad nature of competencies – a unit of job information that provides a crosswalk between levels of interpretation. The SkillObject provides just such a crosswalk. But what is a SkillObject?

SkillObjects[®] represent the future of providing organizations with the information required to make strategic human resource management decisions.

SkillObjects are measurable, detailed descriptions of occupational skills that people do in accomplishing work. A SkillObject consists of the logically clustered skills, abilities, tools, unique knowledge, resources, tasks (2-10), and performance standards that are performed, trained, or evaluated together in a job and required to successfully perform the job.

Defining SkillObjects as given above, SkillsNET draws from the best features of work- and worker-oriented approaches to job analysis. By clustering together job tasks that are **performed, trained, or evaluated together**, as well as the tools and resources required to support those tasks, SkillObjects define the scope of work for the job. Likewise, by grouping the unique knowledge, skills, abilities, and performance standards required to successfully perform those job tasks, SkillObjects cover the underlying worker attributes required for successful job performance. Taken together, SkillObjects define the worker's required "occupational skills" for successful job

performance as well as how those skills are applied in various job tasks (James, Reiter-Palmon, Strange & Young, 2005). The SkillObject classification system takes into account that the whole of a job is greater than the sum of its parts, and ensures that information obtained through job analysis is viewed in context of other job elements. Thus, the SkillObject provides organizations with significant insight into the job and greater appreciation of what that job truly entails. With a new basic unit of job information, SkillsNET has found an innovative solution to the speed of obsolescence issue characterizing task-centric job analyses. Specifically, rather than completing a whole new job analysis whenever tasks change, organizations can now make simple modifications to one or a few SkillObject elements. However, to truly revolutionize job analysis, organizations should be able to capture SkillObjects in a manner that addresses the “3R” problems previously described – Rigor, Rigidity, and Resource Needs. SkillObject Designer, SkillsNET’s web-based job analysis application, does just that.

SkillObject Designer: The Future of Web-Based Job Analysis is Now

In the development of SkillObject Designer, SkillsNET capitalized on the best features of prior inductive and deductive job analysis approaches, particularly O*NET, to capture information on both the work and the worker. Specifically, SkillObject Designer incorporates the skill, ability, and Generalized Work Activity (GWA) taxonomies from O*NET to collect standardized information that may be used to make direct comparisons across jobs.

With SkillObject Designer, fewer of the organization’s personnel, time, material, and financial resources are needed in the long term as compared to the resource demands imposed by traditional job analysis techniques. Specifically, resource requirements using SkillObject Designer are intensive during the initial collection and validation of a job’s SkillObjects. Once the job has been defined, however, the need for these resources decreases significantly as a function of data maintenance. These resource benefits enhance the organization’s overall productivity by eliminating work interruptions, keeping personnel busy in their jobs instead of in job analysis efforts. In addition, SkillsNET personnel actively participate in the job analysis to decrease the organization’s resource burden. Overall, seven key personnel are required during the SkillObject development process:

- **Job Incumbent.** An individual currently holding an indicated job or position.
- **Strategic Task Analysis Representative (STAR).** An individual chosen to define the work they perform and necessary worker attributes for the job being analyzed. A STAR should be a job incumbent recognized as performing in the top 1/3 in their peer group. STARS should also provide representation across all aspects of the job, including difficulty levels, demographic characteristics, and geographic areas.
- **Manager/Supervisor.** An individual controlling or directing the affairs of the business.
- **Reviewer.** An individual who has breadth of knowledge and experience regarding the job being analyzed. Reviewers should be recognized leaders in their field and have been nominated by others to represent the job. Typically, reviewers are supervisors of those performing the job being analyzed.
- **Skills Analyst.** An individual from SkillsNET or the client organization who has experience, understanding, and certification in aspects of job classification, skill definitions and standards, and job analysis. This individual may be a trained and certified employee of the client organization, or an Industrial-Organizational Psychologist, Organizational Development Specialist, or HRD Specialist working for SkillsNET (Brown, Sandall, Osburn, Manning & Dera, 2004).

- **Senior Skills Analyst.** An Industrial-Organizational Psychologist, Organizational Development Specialist, HRD Specialist, or established skills researcher working for SkillsNET who provides oversight to all aspects of data collection, validation, and usage.
- **Skills Compliance Officer (SCO).** A recognized skills researcher working at SkillsNET who interfaces with the client to audit the manner with which the data is collected and utilized. The SCO maintains the integrity of the SkillObject data to ensure proper application in making strategic human resource management decisions.

Personnel from each group provide input as the job moves through various stages of SkillObject Designer. This sequence of inputs was designed to allow top performing job incumbents (STARS) to define the job up front. However, as a means of checks and balances, skills analysts, supervisors, other job incumbents, and managers also provide their inputs to the job. This system of checks and balances increases the buy-in of personnel in the client organization and decreases the likelihood that potential biases of any group will overly influence job information. In this manner, SkillObject Designer shares a feature in common with 360° feedback systems because the job is ultimately defined by a combination of inputs from multiple perspectives. As previously described, the stages involved in SkillObject development afford STARS the most input into how the job is defined. Specifically, STARS define work elements (e.g., tasks, tools, unique knowledge, resources) that comprise the job, and later organize these elements into SkillObjects. Although multiple personnel provide recommendations to the job content, these recommendations are made against a baseline of job data provided by STARS. For more information on the SkillObject development process, the stages of SkillObject Designer are given below:

- **Work Element Generation (WEG).** Multiple STARS audit legacy tasks, tools, unique knowledge, and resources (from O*NET, prior job analyses, National SkillObject Library®, Global Skills Content Library™, other sources) and generate new work elements using O*NET Generalized Work Activities (GWAs) as queuing mechanisms to stimulate thought.
- **Work Element Editing (WEE).** One skills analyst edits the tasks, tools, unique knowledge, and resources created in Work Element Generation to remove redundancies and errors and ensure that work elements follow SkillsNET business rules and principles of Industrial-Organizational Psychology.
- **Work Element Review (WER).** Multiple reviewers examine the edited task, tool, unique knowledge, and resource lists and provide recommendations for further additions, modifications, or deletions to those work elements.
- **Work Element Finalization (WEF).** One skills analyst reviews the recommendations made in Work Element Review and incorporates appropriate revisions into the final task, tool, unique knowledge, and resource lists.
- **Task-to-Skill & Task-to-Ability Linkage.** One skills analysts makes linkages between job tasks and O*NET skills and abilities to define worker attributes needed to successfully perform job tasks. Each job task may be linked to up to two skills and two abilities.
- **Online Task, Tool, and Unique Knowledge Survey.** A sample of job incumbents rates work elements on a variety of customizable rating scales selected by the client organization. This stage is vital for validating work elements and obtaining normative data for how those work elements exist in the job.

- **Online Skill & Ability Survey.** A sample of job incumbents rates the level of skill and ability required to successfully complete job tasks. These data may then be combined to define overall skill and ability proficiencies required for successful job performance. This information provides valuable insight into the worker attributes needed for successful job performance.
- **SkillObject Generation (SOG).** One STAR groups validated tasks, tools, unique knowledge, and resources into SkillObjects, based on the tasks that are performed, trained, or evaluated together and the work elements required to support performance of those tasks.
- **SkillObject Editing (SOE).** One skills analyst reviews and edits the job's SkillObjects to ensure that the job data conform to SkillsNET business rules for development and formatting of SkillObjects.
- **Critical Work Function Entry.** One manager defines the broadest and most essential ongoing responsibilities of the job.
- **SkillObject – Critical Work Function Linkage.** Once the manager defines the Critical Work Functions for the job, he or she links each Critical Work Function to the SkillObject(s) that help support it.

With SkillObject Designer, organizations can capture job information more efficiently than previously thought possible. Rather than taking months or years to collect usable job information, organizations can put that information to work in making strategic personnel decisions in weeks or even days. SkillObject Designer also provides an innovative solution for the toil of rigor imposed by other job analysis methods. Rather than trudging through the full rigor of a new job analysis each time changes occur in the job, organizations complete the full scientific rigor *once* to define the job's SkillObjects, and may continuously and easily update the job data thereafter. For example, instead of completing a new task-centric job analysis when a new computer system is introduced in the job, the organization can simply make minor modifications to a few SkillObject elements to reflect changes in job tasks and tools. As SkillObjects become obsolete much more slowly than tasks, the need to revise job analysis data occurs much less frequently. This benefit of SkillObject Designer increases the longevity of the job analysis in making downstream human resource management decisions.

SkillObject Designer also represents a significantly more flexible approach to job analysis than traditional techniques. The most flexible feature of this approach is the online medium used to collect, survey, and maintain the data. Because the application itself is web-based, organizations may tailor the job analysis to their specific needs, having personnel define jobs at their desks, at proctored sessions conducted by SkillsNET skills analysts, or in distributed collection from home or any other location with Internet access. In fact, SkillsNET can train personnel from the client organization to conduct the job analysis internally in collaboration with SkillsNET skills analysts. Regardless of the chosen method, all SkillObject Designer efforts are supported by SkillsNET's expert skills analysts and help desk support, available 24/7.

In a related vein, SkillObject Designer is intended to capture the inputs provided by multiple STARS and reviewers, and aggregate those inputs into an integrated picture of the job. By allowing multiple STARS to define the job using independently chosen Generalized Work Activities to stimulate thought, SkillObject Designer obtains different perspectives of the job from each STAR. Likewise, allowing multiple reviewers to provide recommendations for change ensures that alterations to job data conform to similar recommendations made by multiple reviewers.

SkillObject Designer represents a significant and innovative step forward in collecting job analysis data and using that information to make strategic human resource management decisions.

By incorporating best features of O*NET and other traditional job analysis techniques, SkillObject Designer provides a crosswalk to rich databases of jobs defined using other techniques. SkillObject Designer also addresses the problems of rigor and resource needs by requiring maximum participation only in the initial collection and validation of a job's SkillObjects. Also, as captured in SkillObjects, job data are guarded against obsolescence as rapid changes occur within the job. The web-based medium of SkillObject Designer provides a number of flexible data collection options and a system of checks and balances for the organization during the job analysis process. Taken as a whole, SkillObject Designer represents a more efficient, effective, and flexible alternative to traditional job analysis techniques for capturing reliable, valid, and legally defensible job information. Finally, unlike traditional job analysis techniques, information captured using this system may be readily applied across a range of human resource management applications.

Strategic Applications of Job Information Captured Using SkillObject Designer

As a means of collecting job information, SkillObject Designer represents a significant and innovative step forward. However, the advantages of the SkillsNET method do not stop at collected and validated job data. Instead, job information collected using SkillObject Designer may be used to make strategic decisions across a number of human resource management domains. Eight such applications previously described are revisited below to illustrate the utility of job information captured using SkillObject Designer:

- **Recruiting & Selection.** By building SkillObjects, organizations can identify the appropriate knowledge, skills, and abilities required to perform the job effectively. These data also allow organizations to assess lateral points of entry based on associated SkillObjects. Data captured in SkillObject Designer ensure that selection tests cover critical job tasks, facilitating selection of “the right person for the right place at the right time.”
- **Capacity Planning.** Through the development of SkillObjects, organizations can identify occupational skills most critical to the organization's strategy. With these SkillObjects in mind, the organization may build its capacity of these critical skills, increasing overall performance.
- **Training & Development.** By collecting SkillObject data, organizations can define training requirements in terms of occupational skills and how those skills are manifested in the job. SkillObject data may also be used to identify performance gaps where training is needed.
- **Personnel Alignment.** By assessing employees' proficiencies in demonstrating various SkillObjects associated with their own or others' jobs, organizations may make appropriate personnel assignments to match workers to jobs consistent with their proficiencies.
- **Promotion.** By building SkillObjects for multiple jobs, organizations can identify knowledge, skills, and abilities required to perform each job, and may sequence the levels of these attributes necessary to achieve promotions. Data captured in SkillObject Designer can help organizations develop promotion tests that cover critical job tasks and worker attributes.
- **Retention.** By strategically linking bonuses and other benefit increases to SkillObjects and associated proficiencies, organizations may increase their ability to not only attract, but retain a highly skilled workforce.

- **Staffing.** Using SkillObject Designer, organizations may enhance their staffing decisions by defining occupational skills associated with a job. This enhanced organizational staffing may, in turn, facilitate more effective workforce planning initiatives.
- **Career Structuring.** Collecting SkillObject data allows employees and management to collaboratively develop career structures. As SkillObjects provide standardized descriptions of positions, these data may be used to develop career plans, organize progression pathways, and manage multiple career bands.

As these examples illustrate, job information captured using SkillObject Designer may be applied across the spectrum of administrative and developmental human resource management domains. During all phases of these efforts, SkillsNET works in collaboration with clients to determine what data serves specific needs and tailor collection and analysis efforts to serve those needs. Many of these needs are served in the development of SkillObjects for specific jobs. However, client needs may require further data processing in other applications to arrive at meaningful conclusions. To help reach these conclusions, SkillsNET offers other web-based applications in a comprehensive suite of job tools.

Further SkillsNET Applications of SkillObject Data for Strategic Client Needs

Once an organization collects and validates SkillObjects for a job, that data may be used in several other SkillsNET analyses and applications. These applications share many of the same advantages as SkillObject Designer (e.g., flexible, available 24/7, efficient, web-based), and may be used to address a number of strategic human resource management needs. Some of these applications require further participation from job incumbents to gather data to be used in making personnel decisions. Other applications, on the other hand, are available to address specific human resource management issues with no further input from job incumbents. The only factor that may limit the analyses and applications available to the client is the type of data collected in the survey portion of the job analysis. These SkillsNET analyses and applications are discussed here:

- **Statistical Analyses and Reports.** Several types of statistical analyses can be conducted based on survey results from SkillObject Designer. Of course, these analyses depend on the data elements surveyed and the rating scales chosen for each data element. A few of these analysis packages and reports include the following:
 - **Basic Statistical Reports.** The most basic statistical reports available present normative data, containing the original survey results and descriptive statistics. SkillsNET can also provide SkillObject reports for each job analyzed. This report includes all SkillObject data for each job analyzed. These types of reports may be customized by client request.
 - **Metrics.** SkillsNET data metrics represent a concise and sophisticated approach to analyzing data to meet the needs of human resource professionals. Each metric applies quantitative and qualitative data in mathematical formulas to answer workforce analysis questions. These metrics make the effective use of job analysis data less cumbersome and more efficient and practical, providing a method of conducting complicated analyses at a lower to the customer.
 - **Cluster Analyses & Commonality Studies.** Cluster analyses use a metric developed by SkillsNET to group similar tasks together. This allows the client to view tasks that may be performed or trained together. Commonality studies use similar formulas to look across levels of data to

determine the percentage of data common across levels. These analyses may assist in training, reduction of learning curves, and identification of jobs that may be merged.

- **SkillObject Mapper™.** SkillObject Mapper measures employee capabilities and experience in demonstrating SkillObjects and using SkillObject elements. This allows organizations to determine strengths and weaknesses of employees and develop capabilities through training. Using SkillObject Mapper, each employee evaluates his or her capabilities in performing SkillObjects and using SkillObject elements. A direct supervisor also independently evaluates the employee's capabilities as he or she has observed them. Based on these ratings, SkillObject Mapper may be used to make decisions about training and development, transferability, eligibility for promotion, difficulty of replacement, and person-job fit.
- **Behavioral Based Interview™.** The Behavioral Based Interview application assists clients in developing, administering, and scoring structured selection interviews. These interviews assess candidate proficiencies in job-relevant skills as demonstrated in prior work, educational, and life contexts. This application also provides guidelines for administering structured interviews including tips and space for note-taking. In scoring, the Behavioral Based Interview application is linked to an online algorithm that simplifies and adds additional standardization and objectivity to the interviewing process.
- **Skills Yellow Pages™.** Skills Yellow Pages allows clients to search a database of employees by a number of criteria including demographic information, skills, abilities, experience, and other factors. Using this application, clients may locate personnel needed for positions or projects based on criteria of interest. Through systematic searches, Skills Yellow Pages allows the user to narrow the pool of potential candidates to an ideal group of employees suitable for the organization's needs.
- **Teaming Engine™.** The Teaming Engine application is a unique tool that allows an organization to define a project to be accomplished. The user then identifies the individual and *team-based* SkillObjects required to accomplish that work, and these SkillObjects are each assigned a weight for later staffing purposes. Finally, the user identifies system-level criteria required for the project. For example, if international work is required, system requirements may include international clearances and cultural awareness. Once all requirements are set, the application identifies employees that fit the project's needs. Based on these personnel, the user may select the most appropriate team for the project.

As these downstream applications of SkillObject data illustrate, SkillObject Designer opens a whole new world of efficient and effective human resource management to organizations. The benefits of SkillObject Designer do not stop with savings in resources and increases in flexibility for collecting job information. Instead, those benefits extend to solutions in other domains of human resource management including selection, training and development, gap analyses, job mergers, and identification of appropriate individuals and team personnel to meet the organization's specific needs. Rather than using multiple job analysis techniques and human resource management solutions to meet various short-term organizational goals, SkillsNET offers a comprehensive suite of integrated applications to solve diverse and long-term human resource management issues. However, none of these benefits are available until the organization steps out of the past of job analysis and takes the forward leap into SkillObject Designer.

Conclusion

Legal requirements compel organizations to make employment decisions based on job analysis information. When properly performed, job analysis also offers increased efficiency and effectiveness to human resource management practices and organizational performance. However, given the rigidity, narrow range of application, and variety of other problems (e.g., speed of task obsolescence, rigor, resource needs) characterizing traditional techniques, it comes as no surprise that organizations are often less than excited about investing in job analysis efforts.

With these facts in mind, SkillsNET set out to create a revolutionary new approach to job analysis that could avoid the pitfalls of traditional techniques. By building on the best features of previous approaches and incorporating standardized taxonomies from O*NET, SkillsNET created SkillObject Designer. The resulting web-based application offers clients an innovative job analysis method that is reliable, valid, and legally defensible while being – unlike traditional job analysis techniques – flexible, robust to job changes, cost-effective, resource-efficient, less rigorous, and more comprehensive. In fact, conducting job analysis using SkillObject Designer represents the foundation of an efficient and effective end-to-end human resource management architecture offered in SkillsNET's integrated suite of applications. Taken as a whole, these innovative, customizable web-based tools empower organizations to make well-informed employment decisions, increase overall performance, and ensure their future readiness to handle the demands of an ever-changing marketplace.

Glossary

Ability - See Enabling Ability.

Ability Linkage - The process of selecting the primary and/or secondary abilities from O*NET Taxonomy of Enabling Abilities to link to tasks.

Affective Traits - The area of human action which emphasizes the internalized processes such as emotion, feeling, interest, attitude, value, character development, and motivation.

Apprentice - A person working under the supervision of a mentor while learning a trade or skill. Apprentices normally have a basic knowledge of the trade, but lack the practical experience to perform proficiently on an independent basis.

Aptitude - A natural talent or ability. Alternatively, an individual's capacity to learn a particular skill.

Attribute - A characteristic of an individual or a thing.

Basic Skill - A developed capacity that facilitates learning or the more rapid acquisition of new knowledge, or facilitates conveying information to others. Basic Skills can be referred to as Learning Skills.

Behavior - An action or set of actions (often referred to as tasks) performed by a person under specified circumstances that reveal some skill, knowledge or attitude. Organizations seek to increase desirable behaviors or introduce new behaviors and/or eliminate undesirable ones.

Behavioral Anchors - A type of assessment in which scale points or values are descriptions of behavior; the placement of benchmark behaviors next to each point on a graphic rating scale; serve as authentication tools to document either proficiency or performance

Benchmarks - Statement of the minimum expectations of what the incumbent needs to know and do in order to make progress toward proficiency. Proficiency is determined by the setting of benchmark scores (referred to as proficiency benchmark).

Capability - The ability to achieve a desired outcome under specified conditions through the performance of a set of tasks.

Child Task - A task statement that is assigned to a Parent Task in the process of Work Element Editing. The child task is usually redundant to the parent task or has been combined with other child tasks to form the most appropriate parent statement to which it is assigned.

Cluster - A group of like cases or observations. Objects in a cluster are similar to each other. They are also dissimilar to objects outside the cluster, particularly objects in other clusters.

Cluster Analysis - A class of statistical techniques that classifies a set of observations into two or more groups based on combinations of variables.

Cognition - The act, power, or faculty of comprehending, knowing, or perceiving.

Cognitive Ability - An ability that influences the acquisition and application of knowledge in problem solving, reasoning, remembering, and understanding. Cognitive Abilities may sometimes be referred to as Mental Abilities.

Competence - Demonstrated performance and application of knowledge to perform a required skill or activity to a specific, predetermined standard.

Competency – A competency is a range of observable behaviors or outputs/outcomes that demonstrates the necessary skills, knowledge, abilities, and other characteristics needed to perform a work role/occupational function successfully. Competencies can be divided into two categories: enabling/foundational competencies and performance-based competencies.

Competency, Core - Fundamental/enabling skills, knowledge, and personal attributes that contribute to an individual's success in accomplishing the organization's mission.

Competency, Cross-Functional - Applicable to multiple functions. Competencies that are important for many positions/roles, organized into categories and cut across traditional organizational lines.

Competency, Specialty - Important for specific assignments. All areas (operations or support) may identify the skills that are critical for their function. Context related.

Complexity - The level of difficulty in performing a task.

Condition for Performance - Description of the conditions in which performance must take place.

Construct Validity - Involves identifying the psychological trait which underlies successful performance on the job, then devising a selection procedure to measure the presence and degree of the trait.

Content Bias - Disproportionate representation of topics and terms within a test.

Content Validity - The degree to which a selection procedure is tied to the domain it intends to measure.

Core Performance Area - A feature or distinctive part of the duties or activities in a particular job.

Core Work - The unique, essential components of a job needed to complete work.

Criterion-Related Validity - The extent to which scores on a test are related to, or predict, some criterion. Criterion-related validity is used to establish a statistical relationship between selection procedures and measures of job performance.

Criticality - A rating scale that is often used in normative surveys of tasks, tools, unique knowledge or resources. The importance of the performance of a task or other item to a job.

Critical Task - A task requiring human performance which, if not accomplished in accordance with position requirements, will most likely have adverse effects on cost, reliability, efficiency, effectiveness, or safety. A task is also considered critical whenever equipment design characteristics demand human performance which approaches the limits of human capabilities.

Critical Work Function (CWF) - A major responsibility that an individual must fulfill in order to achieve the work required for a job/role. The CWF will directly meet a business need or the mission of the organization.

Cross-Functional Skill - A developed capacity that facilitates performance of activities that occur across jobs. Cross-Functional Skills can be referred to as Performance Skills.

Dendogram - A visual tree diagram of the steps in a hierarchical cluster analysis; often used to represent the results of a cluster analysis. Dendograms can be used to visually assess the cohesiveness of the clusters formed and can provide information about the appropriate number of clusters to keep.

Difficulty - A rating scale that is often used in normative surveys of tasks, tools, unique knowledge or resources. The time, effort and assistance required to achieve proficiency of the task or other item.

Dimension - A mechanism used to group data for ease of understanding or used to cue users to consider varying aspects of their job.

Duration - A rating scale that is often used in normative surveys of tasks, tools, unique knowledge or resources. The length of time it takes to complete a task or other item.

Duty - A set of operationally-related tasks within a given job. It is a logical grouping representing one of the major subdivisions of a job and indicates one of the jobs incumbent's main functions.

Education - Education encompasses teaching and learning general and specific skills and the less tangible, i.e. the imparting of knowledge, good judgment and wisdom.

Enabling Ability - Enduring attribute of the individual that influences performance and enables performance of tasks. Enabling Abilities are drawn from a list of 52 enabling abilities in the O*NET taxonomy.

Enabling Skill - Developed capacity that facilitates learning, more rapid acquisition of knowledge, or that facilitates performance of Skills and Competencies. Enabling Skills are drawn from a list of 46 enabling skills in the O*NET taxonomy

Equal Opportunity Employment (EEO) - EEO is a collection of laws, policies, and programs designed to affirm or provide equal access to initial employment and to occupational, benefits, promotions, and other opportunities during employment.

Factor Analysis - An analytical procedure that can be used for identifying the number and nature of constructs underlying a set of measures.

Frequency - A rating scale that is often used in normative surveys of tasks, tools, unique knowledge or resources. The number of times per work period that a task or other item is performed.

Generalized Work Activity (GWA) - Broad categories of work used as a cueing mechanism to generate task statements and identify Knowledge, Skill, and Ability requirements. GWAs are drawn from a list of 42 Generalized Work Activities in the O*NET taxonomy.

Group Factor - A factor that has high loadings with two or more but not all measures or tests. Alternatively: A tool utilized to review normative survey responses indicating percent performance for a task by pay grade to determine at what pay grade a task should be deemed an Occupational Standard.

Hierarchical Cluster Analysis - A statistical procedure used to analyze groupings within data, simultaneously over a variety of scales, by creating a cluster tree. The tree is not a single set of clusters, but rather a multilevel hierarchy, where clusters at one level are joined as clusters at the next higher level. This allows you to decide what level or scale of clustering is most appropriate in your application.

Human Factors Engineering - The systems engineering discipline that addresses integration of human characteristics, capabilities and limitations into system definition, design, development and evaluation to optimize human-machine performance under operational conditions.

Importance - A rating scale that is often used in normative surveys of tasks, tools, unique knowledge or resources. The criticality of performing a task or other item correctly in terms of safety or mission accomplishment.

Incentive - A plan or program that incites or has a tendency to incite desired behavior or action on the part of individuals or groups of individuals.

Interoperability - A term used to describe the ability of different standard-based systems to work together, facilitating exchange of assets across the organization and improving capability, capacity and agility to meet changing performance requirements.

Inter-rater Reliability -The degree of consistency between two or more raters (individuals) in scoring or responding to an item.

Intervention - An action taken to change a behavior or situation. Interventions may or may not include training as well as other human resource related solutions that impact performance.

Job - The total collection of occupational skills, tasks, duties, and responsibilities assigned to one or more positions which require work of the same nature and level.

Job Analysis - The standardized process that examines a specific job to identify all responsibilities and task requirements of a job in an organization. It is a standardized, systematic procedure used by Industrial-Organizational Psychologists, Human Resource, or Personnel Managers to examine a specific job to identify and describe responsibilities and task requirements of the job, regardless of the person in the job.

Job Context - The environments, attributes and variables that make a job unique at its lower levels.

Job Incumbent - A person holding an indicated job or position.

Journeyman - A person considered experienced and competent who has proven practical proficiency in all areas of a trade or skill and completed all apprenticeship requirements. The individual would be expected to perform work independently and mentor apprentices with limited supervision.

K-Means Analysis - A procedure that attempts to identify relatively homogeneous groups of cases based on selected characteristics, using an algorithm that can handle large numbers of cases. However, the algorithm requires you to specify the number of clusters.

Knowledge - See Unique Knowledge.

Knowledge Library - A collection of Unique Knowledge names utilized in performing a job.

KSAT Relationship - The associated set of knowledge, skills, abilities, and tools required to perform given work tasks or sets of tasks.

Legacy Knowledge - A set of Unique Knowledge that has previously been defined for another job. The legacy knowledge is utilized as a starting point for development of Unique Knowledge for the job being analyzed.

Legacy Resources - A set of resources that has previously been defined for another job. The legacy resources are utilized as a starting point for development of Resources for the job being analyzed.

Legacy Tasks - A set of task statements that has previously been defined for another job. The legacy tasks are utilized as a starting point for development of Tasks for the job being analyzed. Legacy tasks could come from many different sources such as: the Global Skills Content Library, data from previous client job analysis, tasks extracted from existing training or educational curriculum, or other sources.

Legacy Tools - A set of tools that has previously been defined for another job. The legacy tools are utilized as a starting point for development of Tools for the job being analyzed.

Master - A person considered to have mastered a trade or skill who is an overseer, foreman, or employer. A worker qualified to teach apprentices and carry on the craft independently.

Measures - Standard evaluations derived from specific benchmarked requirements (e.g. time, accuracy, precision, etc.)

Modernization - Process in the data life cycle to assure data elements are current, accurate and properly represent the appropriate domain.

O*NET - A common-language taxonomy for identifying and organizing occupational requirements developed by the U.S. Department of Labor to replace the Dictionary of Occupational Titles.

Object Modifier - Words used to clarify, amplify, or further describe the object of a task.

Occupational Data - Data associated with a job.

Outsource - To utilize an external source to execute work associated with all or part of a process. Outsourcing generally indicates that the organization has made a tactical or strategic decision to divest itself of the work being performed by the contractor. The work divestiture also indicates that the corresponding skill requirements no longer fall within the organization's strategic future. Contract providers will have to acquire, grow, and maintain the requisite skills to ensure they are able to perform the functions when measured against a prescribed delivery standard.

Parent Task - Final task statements from the Work Element Editing process that have been edited for clarity, correct grammar and spelling used for SkillObject development. The parent task can be created from one or more Children Tasks from the Work Element Generation process that have a similar intent or wording.

Performance - The act of doing something successfully; using knowledge or ability as distinguished from merely possessing it (proficiency); how well a person, team, unit or organization is meeting the work expectations; experience generally improves performance.

Performance Level - The level of performance achieved by the person performing the item. Performance levels are measured against performance standards and requirements.

Performance Standard - The measurable demonstrated behavior required to complete a task.

Personality - The underlying traits, temperaments, attributes, and disposition of individuals that drive behavior and responses to given situations.

Physical Ability - An ability that influences the strength, endurance, flexibility, balance and coordination. Physical abilities may sometimes be referred to as Physical Movement Abilities.

Primary Ability - The foremost enabling ability needed to perform a task.

Primary Skill - The foremost enabling skill needed to perform a task.

Proficiency - Ability to perform a specific behavior (e.g., task, learning objective) to the established performance standard in order to demonstrate mastery of the behavior. This refers to how much of a particular capability a person must have to be successful in his/her work. It is the degree of mastery of a skill or area of knowledge.

Promotion - The advancement of personnel to a higher position requiring greater technical ability, managerial ability or leadership skills.

Psychomotor Ability - An ability that influences the capacity to manipulate and control objects. Psychomotor abilities may sometimes be referred to as Physical Manipulation Abilities.

Rating Scale - A measure based on descriptive words or phrases that indicate a rater's estimate of the value of the thing being rated. Rating scales are frequently used to indicate information about an item within a job or about required performance levels. The scale may be used with rubrics or descriptions of each response value for the rating scale.

Readiness Analysis - Readiness Analysis is direct comparison of required proficiency levels of the work against the rated proficiency levels of the persons performing the work. The result of the differences can be used as an indicator of readiness. This process can also be used for training needs analysis and person to position matching algorithms that need to be skills based.

Refresh – See Modernization.

Reliability - Reliability refers to the extent to which a process or a result can be replicated. A reliable job analysis procedure is one that provides essentially the same information; 1) when it is applied to the same job by another job specialist; 2) when it relies on a different sample of job experts; or 3) when it is applied at a different time.

Representative Sample - Any subset of persons or items selected to represent a larger group or population that has the same inclinations as the total group or population with reference to some characteristic or characteristics.

Resource - Informational source or reference material used to locate information or that houses information about processes. Resources include items such as manuals, publications, guides, handbooks, instructions, tutorials, documents, reports, forms, blueprints, plans, specifications, codes (e.g. National Electrical Code), regulations, etc. Other examples are case law books, Ships Manning Documents, Engineering Operating Sequencing System.

Resource Library - A collection of resources referred to in order to perform the occupational skills for a job or to create the SkillObjects describing the work performed in the job.

Reviewer - An individual who has breadth of knowledge and experience regarding the job. Must be a recognized leader in their field and have been nominated by career panels, technical training review panels, and/or industry partnership management. Typically, Reviewers are supervisors of those performing the job being analyzed.

Science of Learning (SL) - The theories, technologies, and best practices that contribute to society's understanding of what learning is, how adults learn, and how that learning translates into actual job performance. Data from the fields of educational, organizational, industrial and behavioral psychology are the bases of SL, along with analytical methods covering cognition, sociology, and instructional design, performance and human factors engineering information.

This body of knowledge will be considered during training analyses and will be the basis for making training system recommendations and decisions.

Secondary Skill - A skill that is less important than or subordinate to a primary skill in enabling the performance of a task.

Senior Skills Analyst - An Industrial-Organizational Psychologist, Organizational Development Specialist, or established skills researcher who oversees the work of Skills Analysts and helps define certain project scope, boundaries, and approaches.

Sensory Ability - The ability that influences visual, auditory and speech perception. Sensory abilities may sometimes be referred to as Sight and Sound Abilities.

Skill - See Enabling Skill.

Skill Linkage - The process of selecting the primary and/or secondary skills from O*NET Taxonomy of Enabling Skills to link to tasks.

Skills Management System (SMS) - A data repository of SkillObject data and Level II data, coordinated and grouped to represent the occupational skills data associated with work. The SMS also includes the SkillObject proficiency rating data associated with persons performing the work, and will house Level III data in a future implementation. This environment is the staging area to implement the new Human Capital deployment strategy.

Skills Analyst - An individual with experience, understanding, and certification in aspects of job classification, skill definitions/linkages, skill standards, and job analysis, who performs and manages the primary data collection efforts of the SkillObject development process. A Skills Analyst may be a layperson, and Industrial-Organizational psychologist, an organizational developmental specialist, a researcher, or HRD specialist. Skills Analysts must have completed the Skills Analyst Certification training course and practicum to achieve the status of Skills Analyst.

Skills Compliance Officer - The Skills Compliance Officer (SCO) interfaces with clients and those utilizing the SkillObject data and data elements to audit the manner in which the data are collected and utilized by the client. The SCO audits the integrity of the SkillObject data quarterly to ensure the data are not being used in an inappropriate manner.

SkillObject - A SkillObject is a measurable, detailed description of an occupational skill people perform in accomplishing work. A SkillObject consists of the logically clustered skills, abilities, tools, unique knowledge, resources, tasks (2-10), and performance standards that are performed, trained, or evaluated together in a job and are required to successfully perform the job.

SkillObject Data Element - A SkillObject data element is an element associated with a SkillObject that describes a portion of the work, such as a task, tool, unique knowledge, resource, skill, or ability.

SkillObject Designer (SOD) - An analysis product utilized too quickly and cheaply via a distributed web-based approach, capture work, worker, and workplace specific data that require legal defensibility. The SkillObject data are collected one time and then can be used for many strategic and administrative applications such as recruiting, hiring, retention, training design, training needs analysis, employee development, strategic growth and planning, pay banding, competency-based pay systems, best practices workout, and others.

SkillObject Editor (SOE) - Process used by the Skills Analyst to edit components of the SkillObject following SkillObject Generation.

SkillObject Generation (SOG) - Process used by each STAR to generate SkillObjects for a job, by grouping related task statements, tools, unique knowledge and resources.

SkillObject Mapper - An application used to determine observed proficiency levels for employees on the SkillObjects tools, unique knowledge, and resources of the SkillObjects. The outputs from SkillObject Mapper include a skill and knowledge gap analysis for each employee, aggregated skill and knowledge gaps for groups of employees, and learning target identifiers.

SkillObject Survey Tool - An online survey tool used to validate SkillObject data elements or to perform an organizational culture analysis, etc.

Standard for Performance - The standard to which the condition of performance is applied.

Standardization - Process in the data life cycle to standardize work element characteristics that have the same meaning but may be stated in different terms. Standardization also includes the classification and numbering of work elements.

STAR (Strategic Task Analysis Representative) - An individual chosen to generate tasks they perform in the job/occupation being examined. The individual should be currently working in the job on a daily basis (incumbent worker), and be a top 1/3 performer in their peer group. STARS should provide a good cross representation for all aspects of the job, difficulty levels, and geographic areas.

Statement Modifier - Words used to describe the purpose for the action in a task statement. The statement modifier clarifies and describes why the task is taking place.

Strategic Themes - Strategic Themes (ST) are large clusters/dimensions of work/processes essential to meet mission success

Subject Matter Expert (SME) - See STAR.

Survey - A statistical study that produces descriptive or analytical information for the analysis and interpretation of information about some aspect of study by asking pre-determined questions of members of the survey sample or population. Surveys are utilized in the SkillObject system to determine and validate the most important tasks, tools, unique knowledge, resources, skills and abilities that are required to perform the job.

Task Analysis - The processes by which the human, physical, and cognitive performance required to accomplish a unit of work within a job/position in accordance with performance requirements is recorded and analyzed. It may include, but not be limited to, task time, task accuracy, knowledge required, skill and ability required.

Task Statement - The most specific level of behavior in a job that describes the performance of a meaningful job function in terms of a specific action applied to a particular object. The behavior must be observable, have a definite beginning and end, and result in a completed work action or a measurable work product (either the performance can be observed or the results of the performance can be seen and measured). The task is composed of three basic elements: (1) an action verb which states what is to be accomplished in the task, (2) an object which identifies what is to be acted upon in the task, and (3) any qualifying phrases (in terms of an Object Modifier or a Statement Modifier) needed to distinguish the task from related or similar activities, limit and define the scope of the task, and clearly communicate the nature of the task.

Taxonomy - A set of controlled vocabulary terms, usually hierarchical, used primarily to provide a conceptual framework of the structure and content of a system, for discussion, analysis, or information retrieval. Elements of a group (taxon) within a taxonomy should be separated into

subgroups (taxa) that are mutually exclusive, unambiguous, and taken together, include all possibilities.

Tools/Equipment/Software/Devices - Tangible items such as tools, software, equipment, or devices that are required to perform the SkillObject in the course of their work. Typically, tools should require training to master their use.

Tool Library - A collection of tools referred to in order to perform the occupational skills for a job or to create the SkillObject describing the work performed in the job.

Training - Instruction which provides the learner with knowledge and skills required for immediate application in the accomplishment of a specific task or combination of tasks.

Training Analysis - Training analysis is a process that examines the gap between actual performance and desired performance; that is, the gap between prerequisite knowledge [e.g., enabling learning objectives] and performance standards [e.g., terminal learning objectives]. Training analysis is used to determine the content of training curriculum, when training should occur, and who should attend as learners.

Unique Knowledge - The enduring information, gained through experience or study, including processes, procedures, or intellectual capital that are not transitory or temporary, that are committed to memory and that are required to perform the tasks included in a SkillObject.

Unique Knowledge Library - A collection of unique knowledge referred to in order to perform the occupational skills for a job or to create the SkillObjects describing the work performed in the job.

Validity - Validity is the extent to which the analysis measures what it was designed to measure.

Work - Is an activity of group of activities designed and executed to achieve a given end or objective. Organizational work is executed under two unique workforce categories. The first category is “direct labor”. Direct labor represents the portion of work that is directly related to the actual “hands-on” production of the organizations goods, services, or products. The second category is “indirect labor”. Indirect labor represents the portion of work dedicated to supporting the production of the organizations goods, services, or products. From a Navy perspective, work falls into the Occupational and Organizational dimensions.

Work Context Survey - An optional survey module that identifies information about context in which a job is performed. There are eight dimensions covered in the survey covering areas such as communications, interactions with others, autonomy, work environment, health risks, and physical demands.

Work Element Editing (WEE) - The process utilized by a Skills Analyst to reduce and revise a list of tasks, tools, resources and unique knowledge for a given job to eliminate redundancy, clarify items so that they are understandable to others in the occupation, correct spelling and grammatical errors, and to reduce the size of the task, tool, resource and unique knowledge lists without losing important information.

Work Element Finalization (WEF) - The process utilized by a Skills Analyst in order to review the output from the Work Element Review process, in order to make corrections/additions/deletions, taking into account the Reviewer’s comments and suggestions.

Work Element Generation (WEG) - The process utilized by STARs to review legacy data elements and to generate quality task statements, tools, unique knowledge and resources to describe the job in which the STAR works.

Work Element Review (WER) - The process utilized by Reviewers to review the list of task statements, tools, unique knowledge and resources for a job to suggest clarifications, suggest removal of items, and suggest addition of items.

Workload Analysis - The measurement of the various demands, i.e. physical, mental, mechanical or financial, demands that occur while performing a task or combination of tasks.

Example SkillObject Report

Occupation: Secretary
 Job Family: Business Administrative Support Occupations
 Economic Sector: Business, Finance, and Management

SkillObject: Administrative Reporting

Tasks & Enabling Skills and Abilities

Communicate work progress and equipment problems to others

Primary Skill: Writing

Secondary Skill: Operation and Control

Primary Ability: Problem Sensitivity

Draft instructions for operation or repair of equipment

Primary Skill: Writing

Secondary Skill: Operation and Control

Primary Ability: Information Ordering

Draft reports on job procedures for future reference

Primary Skill: Writing

Secondary Skill: Information Organization

Primary Ability: Information Ordering

Enter work progress information into project database

Primary Skill: Writing

Secondary Skill: Operation and Control

Primary Ability: Wrist-Finger Speed

Update equipment manuals with any details or new information that is not already included in the manual

Primary Skill: Writing

Secondary Skill: Information Organization

Primary Ability: Information Ordering

Tools/Software/Equipment

Computerized maintenance management system
 Microsoft Office Suite

Unique Knowledge

Equipment and maintenance manual layouts
 Departmental filing procedures
 OSHA safe job guidelines

Resources

Inventory status books
 Log books
 OSHA safe job procedures manual
 Equipment repair manuals

SkillsNET Services & Customer Success Stories

SkillsNET's web-based job analysis methods and SkillObject Designer software have been instrumental in the success and advancement of our industrial, academic, and government and military clients. The examples given below illustrate SkillsNET's proven results stemming from job analysis using SkillObject Designer.

Industry

Mi-SWACO. SkillsNET completed worldwide job analyses to define lists of tasks, tools, resources, unique knowledge, skills and abilities required for successful performance in the Drilling Fluid Engineer position at Mi-SWACO. Survey results illustrated differences in how individuals in various job groups and geographic regions perceived their work, while high agreement was found worldwide among tasks they performed and the importance of those tasks.

ATK. ATK was faced with an aging workforce – half of their engineering staff was ready to retire. SkillsNET customized web-based demographic surveys that were distributed to employees. Survey results were fed into an on-line querying tool, Skills Finder. Skills Finder allowed ATK to search for employees based on specific requirements for a particular job. This allowed ATK to utilize its current workforce in areas that may have otherwise been overlooked.

Cisco Systems. Cisco Systems wanted to ensure that the certification content being taught was required to perform the job. Certifications analyzed included the CCNA, CCNP, CCDA and CCDP programs. Cisco was also interested in discovering new certifications that could be offered to the technical population in charge of servicing their equipment. SkillsNET conducted job analyses on existing certifications and guided Cisco in redesigning their certification content and teaching process. SkillsNET was also able to identify work to support an additional certification.

CitiFinancial. Using SkillObject Designer, CitiFinancial analyzed its Loan Officer position. Job analysis data helped CitiFinancial to identify three levels of Loan Officer positions in the organization. SkillObjects were identified for positions in each tier, and training requirements were linked to these SkillObjects. SkillsNET identified the top ten skills and abilities required for the three positions. This information helped CitiFinancial to focus selection on these skills and abilities.

First Hawaiian Bank. SkillsNET performed job analyses for First Hawaiian Bank's customer service positions and determined that 40% of these employees' time was being spent on administrative activities instead of focusing on customer service. The job analysis allowed First Hawaiian Bank to re-structure the customer service department, resulting in a more efficient workforce.

General Electric. SkillsNET performed a job analysis of General Electric's (GE) sales personnel and determined that 80% of their time was spent on bureaucratic duties, not towards driving sales. This insight allowed GE to reorganize the functions of their sales representatives to ensure that workforce activities were aligned with the mission of the organization.

Stuart C. Irby Company. Stuart C. Irby Company recently merged into Sonepar, the world's largest electrical distributor, a \$15 billion international organization based in France. SkillsNET helped optimize workforce operations for Irby's rapidly changing branch operations and sales and management team. Irby used SkillObject Designer to conduct job

analysis for various positions in these departments. This job analysis was a key factor in moving the operations and sales functions to effectively manage organizational changes.

Academia

University of Hawaii. SkillsNET's on-line job profiling system provides an effective conduit between industry and academia. As a registered user, local employees may develop a job profile, job description, and skill gap analysis using SkillsNET's web-based tools. Based on this information, the employer can notify the University of Hawaii for identification of training interventions. Using this system, educators and employers gain insight into the criticality of training for specific jobs and can make educated decisions on how training is implemented.

Military & State Governments

United States Navy. The Navy required a comprehensive system to identify the knowledge, skills and abilities their sailors need to be successful in defending our country. After an extensive analysis of the marketplace, the Navy determined that SkillsNET's SkillObject Technology would drive all job analysis, training, development and proficiency requirements for each community (e.g., Enlisted, Officers, Reservists, Civilians) in the Navy. This ongoing project focuses on five areas of concentration separated into levels of expertise: Professional development, personal development, professional military education and leadership, certifications and qualifications, and performance.

United States Coast Guard. The United States Coast Guard (USCG) faced several challenges on the Chief Warrant Officer (CWO) job. These issues concerned workforce training, details of the current role, and future competencies needed. The USCG used SkillsNET's job analysis methodology to gather data from Coast Guard personnel representing different specialties. The analysis showed significant differences between specialties and illustrated specialties that needed to be added.

National Security Agency. SkillsNET played a significant role in reengineering the Information Technology division with the National Security Agency (NSA). The National Security Agency had a total of 300 unique job titles with less than 40 functionalities. Using innovative web-based solutions, SkillsNET helped the National Security Agency organize jobs by function rather than title.

State of Arkansas. The Arkansas State Legislature created a means by which state employees could receive bonus pay beyond their base salary. The Arkansas Department of Workforce Education (DWE) was tasked with implementing this program in an equitable manner. To determine if a project would be eligible for consideration, the DWE needed to determine the activities performed by their personnel. SkillsNET used SkillObject Designer to capture the work performed by personnel within each job classification. By completing analyses of over 50 jobs in eight weeks, SkillsNET allowed the DWE to successfully implement the competency-based bonus pay system.

State of Oklahoma. The Oklahoma Employment Security Commission (OESC) used SkillsNET's system to provide job analysis services to employers throughout the state of Oklahoma. With the assistance of SkillsNET, local employers were empowered to identify the skills needed to maintain their competitive workforce and training programs to fill those gaps. SkillsNET's process facilitated the creation of appropriate skills development opportunities for emerging, incumbent and transitional workers. The associated labor exchange process fostered the creation of employment opportunities with the ability for prospective employers to create successful job matches.

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