
Summary Report

Updating the Detailed Work Activities

Prepared by

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Division of Skills Assessment and Analysis

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Executive Summary

Project Need

The purpose of the project was to improve the usability of the Detailed Work Activities (previously referenced as Labor Exchange Skills and Work Content Statements). Specific goals were to refine statement quality, link statements to the general Work Activity elements contained in the O*NET Content Model, and outline a process for developing an organizing system that groups the over 2000 statements to maximize usability.

Upon initial review of the Detailed Work Activities (DWAs), duplication to existing O*NET Content Model elements, statement redundancies, compound statements, and unclear statements were detected. This project eliminated detected instances of the above listed cases. A cleaned dataset is available for distribution and for use in the development of a database structure to aid labor exchange.

Project Benefit

Work Activities as listed in the O*NET Content Model are good descriptors of work; however, since they are broad descriptors of work they are less viable for differentiating nuances within an occupation (i.e. targeted labor exchange). Tasks while providing high differentiation are occupation specific and provide little opportunity for cross-occupation comparisons. Detailed Work Activities are an intermediate descriptor that allows cross-occupational matching while preserving differentiation, provide a common language for work description, and are easy to understand.

The updated data files contain refined statements that are content consistent (work activities), meaningful and are unique descriptors. The following list outlines the specific benefits of the DWAs.

- They provide succinct yet detailed information about occupational work activities that can aid career exploration.
- They are integrated into the O*NET Content Model via their link to the general Work Activity elements.
- They provide a structure for describing work experience that is useful for resume building.
- The more general nature of the statements in contrast to O*NET Task elements facilitates cross-occupational correspondence and helps displaced workers identify new areas of work that match their capabilities. In addition, educators, job seekers, researchers and employers can use the DWAs to perform analysis of transferable skills and skill gaps.
- They provide a structure for profiling work requirements that employers can use to write job orders or position descriptions.
- They promote the use of a common language for describing the activities that occur within occupations that can serve as a basis for unifying industry sector skill standards.

Key Recommendations

The following list highlights ways to increase the functionality of the DWAs.

- Develop and validate an organizing hierarchy that groups the 2000+ DWAs
- Review Occupational linkages to the DWAs to ensure adequate coverage
- Link the O*NET Content Model Knowledge Elements & Area Knowledge Specialties to the DWAs to provide descriptive information on the requirements to perform these activities
- Evaluate newly written task statements to validate DWA coverage and delineate a process for continuous updates
- Develop an O*NET online interface as a point of entrance to access the statements

Background

Introduction

Detailed Work Activities (DWAs) provide information on the common activities required across occupations by coding the work activities to O*NET-SOC occupations. Historically, they have been called Work Content statements, Skill statements, and Labor Exchange statements. The new name more accurately describes the content and provides inherent meaning into their nature. This title also reflects their intermediary position between the more general Work Activities contained in the O*NET Content Model and occupational tasks which are considerably more specific.

Recognizing the need for statements describing work at a more detailed level than O*NET general Work Activity elements and less detailed than O*NET Tasks, a database of statements was developed by the state of Oregon and edited by the U.S. Department of Labor, Employment and Training Administration (DOL-ETA). This project modified the statements to eliminate duplication and edited them for standard language and clarity. The initial guidelines for the statements and the history of their development are contained in the Labor Exchange Skill Project Final Report (http://www.onetcenter.org/dl_files/FRptLES.pdf)

The current project has evolved from the recommended next steps of the Labor Exchange Skills project as well as from user feedback on the manageability of the database. The project goals are as follows:

Refine statements for clarity and style consistency

Remove duplication with the Content Model (Knowledge, Skill, Ability and Work Context elements)

Remove statement redundancies

Increase the number of raters assigning the statements to the Content Model general Work Activity elements to improve reliability

Develop a plan for empirically deriving a hierarchy that organizes the large number of statements to enhance their usability

History

This section provides an overview of the history of the Detailed Work Activities. For more information on the genesis of the statements, reference the Labor Exchange Skills Project Final Report listed above.

Stage I. Several years ago prior to the release of the O*NET program, the state of Oregon developed a set of skill statements to help an individual identify their skills and match them to occupations. These statements were developed for Occupational Employment Statistics (OES) occupations and based on information from sources such as the Classification of Instructional Programs (CIP), the OES occupations, and the Dictionary of Occupational Titles (DOT) attributes.

Stage II. To align these statements to the O*NET program many new statements were written to cover O*NET occupations. O*NET occupation tasks were used as the basis for adding statements. In 2002, a work team continued to revise the statements to enhance cross-occupational skill statement usage, ensure coverage of the O*NET tasks, eliminate duplication and edit for clarity and consistency. The project produced 2,345 statements.

Stage III. In the fall of 2002, a team of analysts reviewed the statements to identify ways to streamline the database. The findings are as follows.

Initial Review

This section summarizes the findings from an initial review of the statements and forms the priorities of this project.

Statement Usage

Finding: Currently, the DWAs are incorporated into the O*NET Code Connector (<http://www.onetcodeconnector.org/>) which connects commonly used job titles with the Department of Labor's official occupational classification system in addition to being stored on the National Crosswalk Service Center website.

Conclusion: To promote the use of these statements they should be made available as part of the O*NET supplemental database.

Statement Style:

Finding: All statements were intended to describe work activities; however, some statements more closely resemble a Knowledge, Skill, Ability or Work Content element. Tables 1-4 present descriptive information about the content of the statements. Most notably, these tables demonstrate that the statements are of a mixed type in that they represent Knowledge, Skill, Ability and Work Context elements in addition to Work Activities. By definition, these statements should describe work performed. Statements linked to a Knowledge, Skill, Ability or Work Context element signifies duplication of the Content Model. An example is the DWA "Apply principles or theories of chemistry". It duplicates the Content Model Knowledge element – "Chemistry" which is defined as having knowledge of the chemical composition, structure and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal.

Conclusion: Identify and remove all statements that do not represent a work activity and duplicate Content Model descriptors. Before removing a statement, they should be verified against the Content Model to ensure no descriptive information is lost. In the future, Content Model descriptors that already capture this information should be integrated with the DWAs. For more information on potential plans to connect Knowledge requirements to the DWAs, see Chapter 6 of this report. Appendix A contains the O*NET Content Model descriptors.

Table 1. Association of DWAs to the Content Model Knowledge elements (Original Ratings)

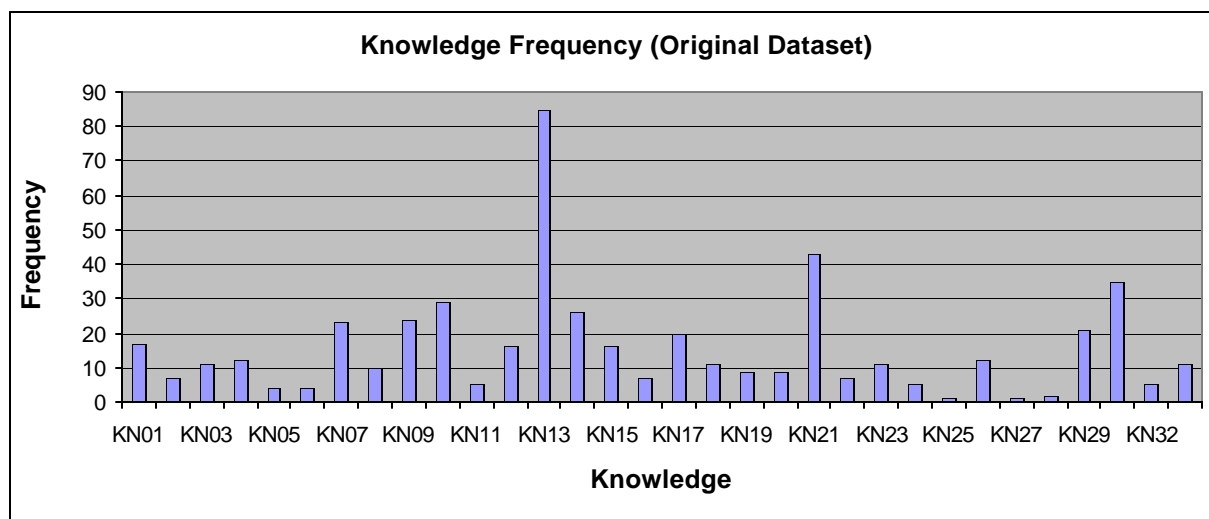


Table 2. Association of DWAs to the Content Model Skills & Work Context Elements (Original Ratings)

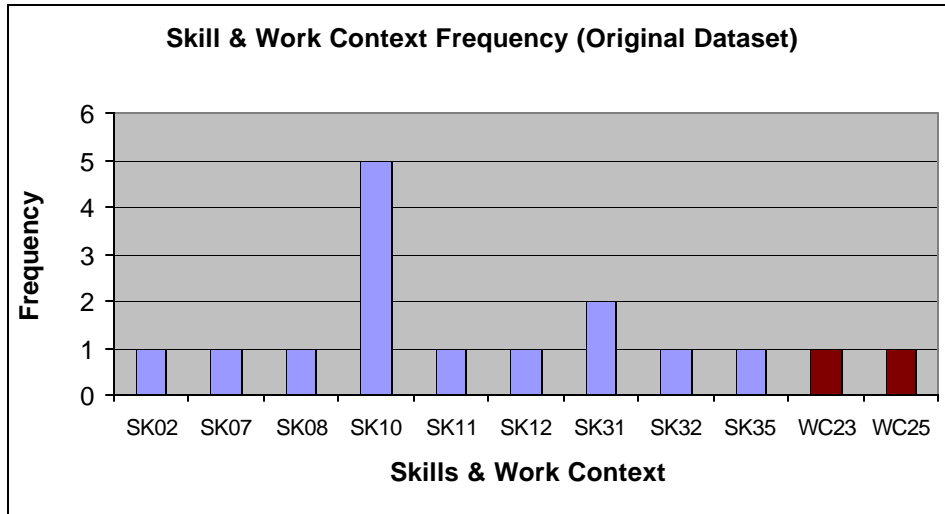


Table 3. Association of DWAs to the Content Model Ability Elements (Original Ratings)

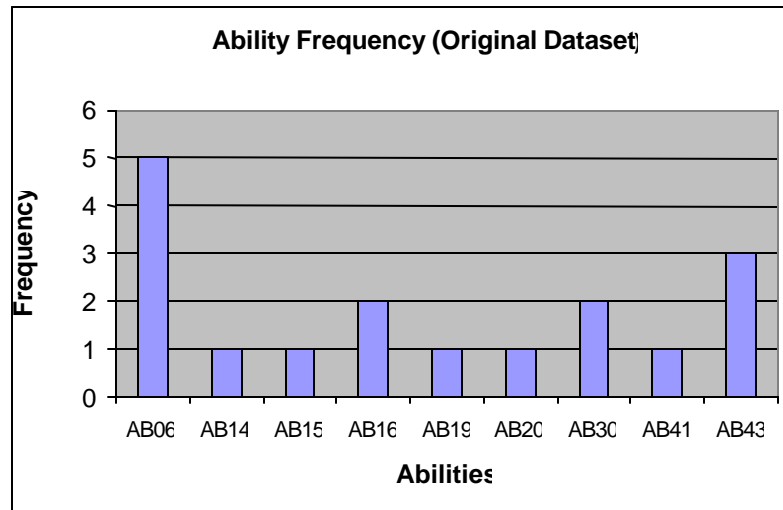
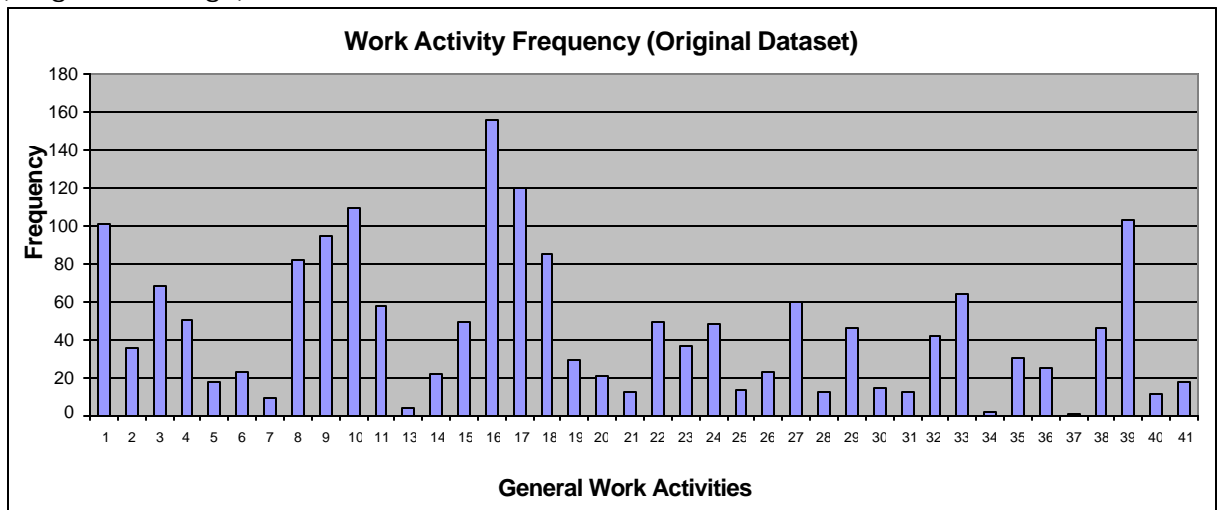


Table 4. Association of DWAs to the Content Model General Work Activity Elements (Original Ratings)



Statement Redundancies & Clarity

Finding: There was minor overlap among the DWA statements suggesting that content was redundant. The criterion for retaining a statement is that it must represent a unique aspect of work performed. In addition, a number of statements provided vague description of work activities. The criterion for statement content is that it describes a concrete work activity.

Conclusion: Remove redundant and vague statements to enhance the manageability of the database.

Linkages to the Content Model

Finding: To promote integration among different descriptors of work, the statements were linked to the O*NET Content Model descriptors. In an earlier phase of the project, a subject matter expert assigned the statements to the Content Model descriptors.

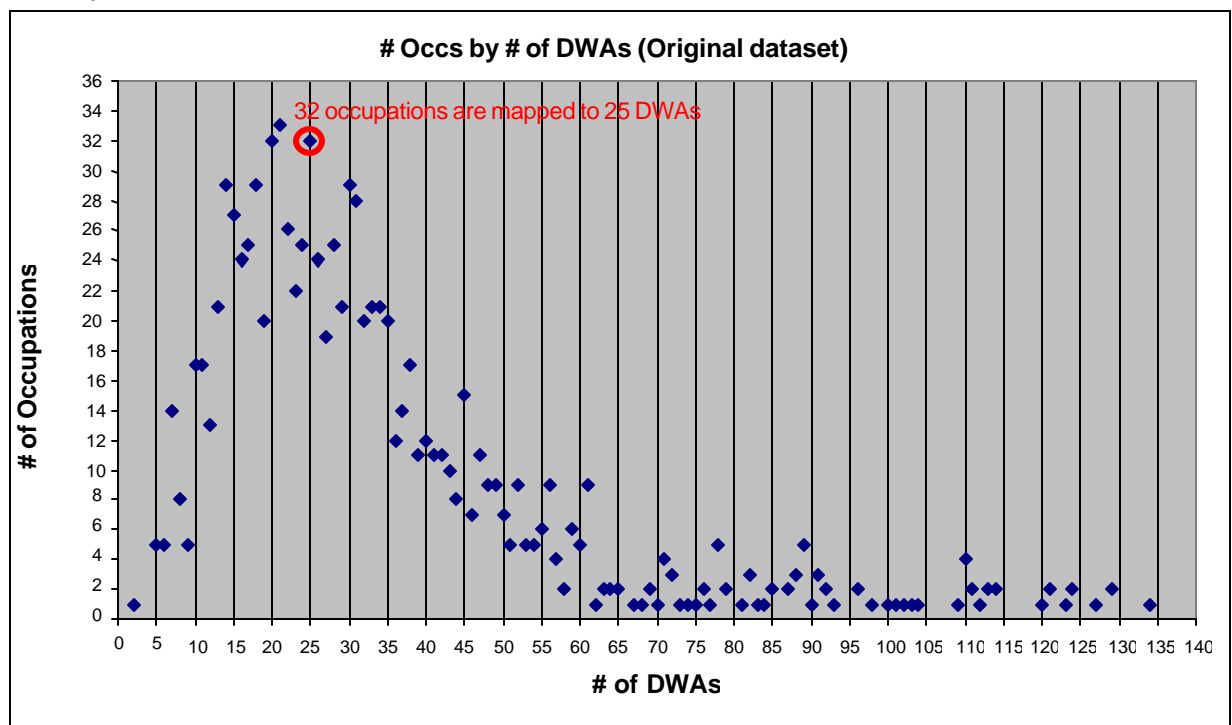
Conclusion: Have a team of three assign all updated DWA statements to the general Work Activity descriptors to integrate them into the O*NET database. Increasing the number of raters will increase reliability.

Linkage to Occupations

Finding: All statements link to multiple occupations to promote cross-occupational description. Of the 954 occupations, 741 occupations link to 10-45 statements (see table 5). There are 32,754 occupational linkages. A number of occupations are linked to over 100 DWAs (n=27). This raises questions about the usefulness of those DWAs.

Conclusion: Identify and remove any statement that appears too broad and lacks usefulness as a detailed descriptor. These statements approach the level of a general Work Activity as contained in the Content Model.

Table 5. **The Number of Occupations by the Number of Work Activities (Original dataset)**



Update Activities

Overview

This section highlights the key changes made to the DWA statements to improve their usability. The update activities are a product of the previous Labor Exchange project recommended next steps and an initial review of the database in the last quarter of 2002. Table 8 summarizes the major changes to the database. The following list highlights the actions taken.

- Improve the quality of the statements
 - Remove overlap/redundancies among the DWAs
 - Remove unclear statements (i.e. compound and vague statements)
 - Rewrite all statements to ensure they are meaningful and understandable
- Identify statements that are NOT work activities and remove those statements that duplicate the O*NET Content Model Elements
- Rate skill statements on general Work Activity elements to link them to the Content Model

Prior to the decision to update the activity statements, users provided feedback on the DWAs at the Association of Computer-Based Systems for Career Information. Their feedback confirmed the priorities of the project. A description of comments obtained from the feedback session is contained in Appendix B.

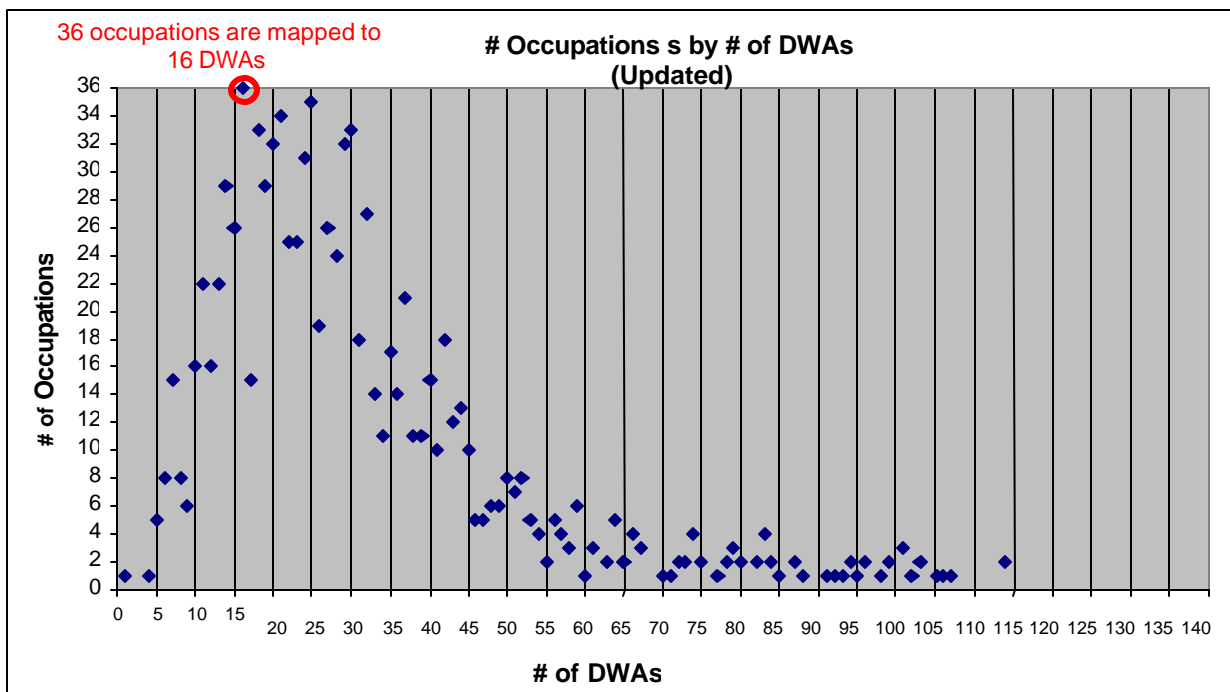
Quality Control

Statement Redundancy – A number of statements were redundant and did not add descriptive value. Each redundant work activity was rolled into the corresponding activity so that each work activity described a unique aspect of work performed. Table 8 summarizes the details of the changes.

Statement Usability – Raters also assessed statements for their meaningfulness and usefulness in describing work performed on a job. A number of statements were removed from the database because they were vague and of poor utility in describing work actions. An example is “understand technical information”. Table 8 summarizes the changes. A total of 29,975 occupational links were maintained. Table 6 depicts the number of occupations associated with the number of DWA links. In comparison to table 5, the updated database has fewer extreme occupations (those with more than 100 DWAs mapped to it). Currently, only 11 occupations have more than 100 DWA descriptors. This number was reduced from the original 27 occupations.

Statement Additions – Added to the database was one statement (‘code data from records’). Originally, it was contained in a compound sentence structure (‘review records for completeness or to abstract or code data’).

Table 6. The Number of Occupations by the Number of Work Activities (Updated dataset)



Elimination of Content Model Duplication & Linkage to the O*NET Work Activities through SME Ratings

Content Model Duplication – The review ensured that all of the statements represent work activities (i.e. actions performed on a job). A number of statements referenced the application of a specific knowledge such as “apply knowledge of chemistry”. Consequently, the team separated the “apply statements” into three categories (a) applying principles and theories, (b) applying techniques and procedures, (c) applying information.

Type (a) represents broad declarative knowledge relating to broad bodies of knowledge, e.g., knowledge of chemistry. This second type is not useful in labor exchange and is redundant with the Content Model Knowledge domains. After being verified against Knowledges and Job Specialty Knowledges to ensure coverage, these statements were removed from the database. Ways to link the Content Model Knowledge elements and the Job Specialty Knowledges back to specific DWAs and O*NET SOC may be an area of future exploration.

Type (b) represents demonstration of specific techniques and procedures. These statements reflect a work activity and were rewritten to ensure meaningfulness.

Type (c) represents the application of information (e.g. apply labor market information). These statements typically reflect the general Work Activity “Using Relevant Knowledge”. These statements were rewritten to reflect a work activity and ensure meaningfulness.

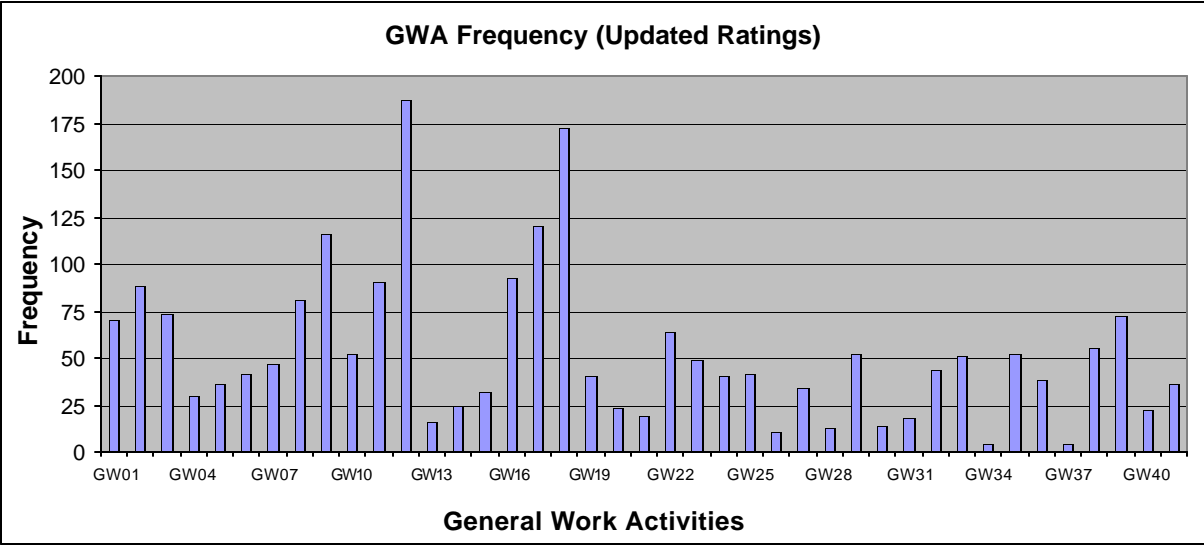
In addition, one statement reflected a Content Model Skill element and one represented an Ability requirement. Both of these statements were removed from the database to enhance content consistency. Throughout the review process, all occupational links were checked for all questioned statements to aid in the interpretation of the statement and to ensure that no important descriptive information was lost. As previously mentioned, discussions are underway to ensure that all removed statements are reflected in existing descriptors that are then linked to the DWAs.

Content Model Mapping – Three raters reviewed all statements and each rater assigned each DWA to a general Work Activity element (1-41). DWAs link to general Work Activities because both describe like content in varying levels of specificity. The general Work Activities are broader than DWAs. Rating outcomes fell into three categories (3-way agreement, 2-way agreement, or no agreement). Ratings were final when rating assignment was unanimous.

When ratings were not unanimous, raters discussed statement meaning and examined occupational links to identify the type of work performed. Raters also reviewed tasks and occupational descriptions and then re-rated the statements. The process iterated until raters reached consensus. Table 7 summarizes the linkages to the O*NET Content Model general Work Activity elements.

In some instances, raters could not assign statements to a Work Activity. These statements did not reflect a concrete work activity and treatment of them is below. Once ratings were complete, validation of assignments occurred. As a result, each general Work Activity cluster (e.g. Getting Information) is homogenous in that the DWAs assigned to it represent similar activities. In addition, a within cluster verb consistency validation ensures that verb usage is consistent and references the same type of activity.

Table 7. Association of DWAs to the Content Model General Work Activity Elements (Updated Ratings)



Database Summary of Changes

Data Statistics

Table 8 summarizes the major changes between the original and the updated database.

Table 8. Summary of Major Changes

Change	Original	Updated	Purpose
Title	Labor Exchange Skills	Detailed Work Activities	<ul style="list-style-type: none"> More accurate description of statement content
Content Model Linkage Process	Assigned by 1 SME	Assigned by 3 SMEs	<ul style="list-style-type: none"> Increase reliability
Statement Type	GWAs (78%) KN (21%) SK,AB & WC (~1%)	GWAs (100%)	<ul style="list-style-type: none"> Create a data file containing the same style/type (i.e. work activities)
Work Activities mapped to the Content Model	see Tables 1-4	see Table 7	<ul style="list-style-type: none"> Work activities were mapped only to GWAs as they reflect broader categories of work activities unlike the other Content Model elements which represent worker attributes etc.
Total Number of Statements	2345	2165 (1 statement added & 181 removed)	<ul style="list-style-type: none"> Remove redundancy with the Content Model and within the activities Remove compound and other unclear statements
Removed Statements	na	181	Removed: <ul style="list-style-type: none"> 2 abilities, 114 knowledges, 12 unclear statements, 52 redundant to other work activities
Rewritten Activities	na	Of the 2165 statements, 319 were edited	<ul style="list-style-type: none"> Remove ambiguous verbs and modify unclear activity statements
Distribution of Occupational links	See Table 5	See Table 6	<ul style="list-style-type: none"> Original database: 741 occupations have 10-45 DWA linkages & 413 occupations have 15-30 DWA linkages Updated database: 782 occupations have 10-45 DWA linkages & 455 occupations have 15-30 DWA linkages
Total # of Occupations	974	974	
Total # of Occupational Linkages	32,754	29,975	

Products for Delivery

Database & Reports

The main products produced for distribution are located at www.onetcenter.org/dl_files/detailed_wk_activities.zip

- The database of Detailed Work Activity statement contains five text files that provide information on the DWAs, their linkages to the O*NET Content Model general Work Activity elements and O*NET-SOC Occupations. The files are as follows.
 - CME_code.txt (contains O*NET-Work Activity titles and codes as contained in the O*NET 5.0 database)
 - DWA_Code.txt (contains DWA titles and codes)
 - DWA_by_CME.txt (contains the DWA mapping to the O*NET Content Model Work Activity via the element id)
 - ONET_Code.txt (contains O*NET-SOC data)
 - ONET_by_DWA.txt (contains the DWA mapping to the O*NET SOC data)
- The Data Dictionary describes the structure of the data files. All variable names are consistent with the 5.0 O*NET release.
 - Readme.pdf

Recommendations

Next Steps

This section outlines possible procedures to promote the usability of the statements through continued attention to statement quality, development of an organizing hierarchy, identification of a process for updating and validating DWA completeness, integration with existing Knowledge and other worker requirement descriptors, and through development of a portal to access the DWAs via O*NET online. For additional thoughts on future work, reference the Labor Exchange Skills Project Final Report referenced earlier. The proposed recommendations are as follows.

1. Continue to refine the **quality** of the database through the following.
 - a. Review of Extreme Occupations – Extreme occupations are those that have fewer than ten and more than 100 DWAs mapped to it. Currently, 44 occupations have 2-9 DWAs mapped to it. These occupations should be reviewed for DWA coverage to ensure that all possible linkages are made. Those occupations that have greater than 100 statements (n=11) should be reviewed for usefulness in providing detailed information about work performed.
 - b. Review of Extreme DWAs – Extreme DWAs are activities mapped to fewer than five or greater than 75 occupations. These statements are less useful in labor exchange. Currently, 988 statements fall into these categories.
2. Create an empirically driven **organizing hierarchy** that groups the statements into categories. Hierarchical clustering algorithms are being used to generate the categories. Preliminary analyses identified approximately 100 clusters that group the DWAs into meaningful areas of work that can facilitate labor exchange.

The organizing structure can serve as an access point into the larger database. These categories promote usability of the information in that a user can navigate among ~100 categories instead of 2000+ statements. In addition, this hierarchical structure can facilitate labor exchange operations. Each cluster organizes DWAs based on their co-occurrence within an occupation taking into account not only the activities but also the Knowledge, Skills and Abilities required to perform the activities. As such, an individual can explore potential labor opportunities that match their current experiences. This is especially important for displaced workers.

3. **Maintain the currency** of the activities over time through the following.
 - a. Develop procedures for including new NCSU task statements into the DWA database. Two potential methods are as follows.
 - i. Rate a sample of occupations against Task statements to assess the extent the DWAs reflect the occupation (gap identification)
 - ii. Collaborate with employers to verify the completeness of the DWAs
 - b. Validate the general Work Activity ratings (which link the DWAs to the Content Model) by comparing the SME ratings against incumbent responses to identify any activity gaps. A team of analysts can write work activities to cover any identified gaps.
4. Explore how the DWAs might map to the **Job Specialty Knowledge areas** and the **Content Model Knowledge elements**. A number of statements resembling Knowledge areas were removed from the database to improve content consistency. This mapping would promote further integration of the database with current taxonomies and databases. In addition, a number of removed statements referenced math requirements (e.g. apply

advanced technical math (trig, calculus, statistics etc.)). A method for relating math levels to the DWAs needs to be outlined. These linkages could be especially useful for educational institutions in the development of curricula and for career guidance.

5. **Map the DWAs to other worker characteristics** to identify requirements needed to perform the DWAs (e.g. Content Model Ability and Skill elements). Integration of worker requirements and DWAs provides a basis for identifying occupational competencies.
6. Promote accessibility of the dataset by developing an **O*NET online segment** to navigate through the DWA database.

Appendix

A. O*NET Content Model Elements

WORK ACTIVITY DOMAIN

01. Getting Information: Observing, receiving, and otherwise obtaining information from all relevant sources.
02. Identifying Objects, Actions, and Events: Identifying information by categorizing, estimating, recognizing differences or similarities, and detecting changes in circumstances or events.
03. Monitoring Processes, Materials, or Surroundings: Monitoring and reviewing information from materials, events, or the environment, to detect or assess problems.
04. Inspecting Equipment, Structures, or Materials: Inspecting equipment, structures, or materials to identify the cause of errors or other problems or defects.
05. Estimating the Quantifiable Characteristics of Products, Events, or Information: Estimating sizes, distances, and quantities; or determining time, costs, resources, or materials needed to perform activity.
06. Judging the Qualities of Objects, Services, or People: Assessing the value, importance, or quality of things or people.
07. Evaluating Information to Determine Compliance with Standards: Using relevant information and individual judgment to determine whether events or processes comply with laws, regulations, or standards
08. Processing Information: Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.
09. Analyzing Data or Information: Identifying the underlying principles, reasons, or facts of information by breaking down information or data into separate parts.
10. Making Decisions and Solving Problems: Analyzing information and evaluating results to choose the best solution and solve problems.
11. Thinking Creatively: Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions.
12. Updating and Using Relevant Knowledge: Keeping up-to-date technically and applying new knowledge to your job.
13. Developing Objectives and Strategies: Establishing long-range objectives and specifying the strategies and actions to achieve them.
14. Scheduling Work and Activities: Scheduling events, programs, and activities, as well as the work of others.
15. Organizing, Planning, and Prioritizing Work: Developing specific goals and plans to prioritize, organize, and accomplish your work.
16. Performing General Physical Activities: Performing physical activities that require considerable use of your arms and legs and moving your whole body, such as climbing, lifting, balancing, walking and handling of materials.
17. Handling and Moving Objects: Using hands and arms in handling, installing, positioning, moving materials, and manipulating things.
18. Controlling Machines and Processes: Using either control mechanisms or direct physical activity to operate machines or processes (not including computers or vehicles).
19. Working with Computers: Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.
20. Operating Vehicles, Mechanized Devices, or Equipment: Running, maneuvering, navigating, or driving vehicles or mechanized equipment, such as forklifts, passenger vehicles, aircraft, or water craft
21. Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment: Providing documentation, detailed instructions, drawings, or specifications to tell others about how devices, parts, e or structures are to be fabricated, constructed, assembled, modified, maintained, or used.

22. Repairing and Maintaining Mechanical Equipment: Servicing, repairing, adjusting, and testing machines, devices, moving parts, and equipment that operate primarily on the basis of mechanical (not e principles).
23. Repairing and Maintaining Electronic Equipment: Servicing, repairing, calibrating, regulating, fine-tuning, or testing machines, devices, and equipment that operate primarily on the basis of elect electronic (not mechanical) principles.
24. Documenting/Recording Information: Entering, transcribing, recording, storing, or maintaining information in written or electronic/magnetic form.
25. Interpreting the Meaning of Information for Others: Translating or explaining what information means and how it can be used.
26. Communicating with Supervisors, Peers, or Subordinates: Providing information to supervisors, coworkers, and subordinates by telephone, in written form, e-mail, or in person.
27. Communicating with People Outside the Organization: Communicating with people outside the organization, representing the organization to customers, the public, government, and other external source information can be exchanged in person, in writing, or by telephone or e-mail.
28. Establishing and Maintaining Interpersonal Relationships: Developing constructive and cooperative working relationships with others, and maintaining them over time.
29. Assisting and Caring for Others: Providing personal assistance, medical attention, emotional support, or other personal care to others such as coworkers, customers, or patients.
30. Selling or Influencing Others: Convincing others to buy merchandise/goods or to otherwise change their minds or actions.
31. Resolving Conflicts and Negotiating with Others: Handling complaints, settling disputes, and resolving grievances and conflicts, or otherwise negotiating with others.
32. Performing for or Working Directly with the Public: Performing for people or dealing directly with the public. This includes serving customers in restaurants and stores, and receiving clients or g
33. Coordinating the Work and Activities of Others: Getting members of a group to work together to accomplish tasks.
34. Developing and Building Teams: Encouraging and building mutual trust, respect, and cooperation among team members.
35. Training and Teaching Others: Identifying the educational needs of others, developing formal educational or training programs or classes, and teaching or instructing others.
36. Guiding, Directing, and Motivating Subordinates: Providing guidance and direction to subordinates, including setting performance standards and monitoring performance.
37. Coaching and Developing Others: Identifying the developmental needs of others and coaching, mentoring, or otherwise helping others to improve their knowledge or skills.
38. Providing Consultation and Advice to Others: Providing guidance and expert advice to management or other groups on technical, systems-, or process-related topics.
39. Performing Administrative Activities: Performing day-to-day administrative tasks such as maintaining information files and processing paperwork.
40. Staffing Organizational Units: Recruiting, interviewing, selecting, hiring, and promoting employees in an organization.
41. Monitoring and Controlling Resources: Monitoring and controlling resources and overseeing the spending of money.

KNOWLEDGE DOMAIN

01. Administration and Management: Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production method coordination of people and resources.
02. Clerical: Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office proc and terminology.
03. Economics and Accounting: Knowledge of economic and accounting principles and practices, the financial markets, banking, and the analysis and reporting of financial data.
04. Sales and Marketing: Knowledge of principles and methods for showing, promoting, and selling products or services. This includes marketing strategy and tactics, product demonstration, sales techniques sales control systems.
05. Customer and Personal Service: Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, evaluation of customer

satisfaction.

06. Personnel and Human Resources: Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel info
07. Production and Processing: Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.
08. Food Production: Knowledge of techniques and equipment for planting, growing, and harvesting food products (both plant and animal) for consumption, including storage/handling techniques.
09. Computers and Electronics: Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
10. Engineering and Technology: Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and of various goods and services.
11. Design: Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
12. Building and Construction: Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
13. Mechanical: Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
14. Mathematics: Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
15. Physics: Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, a sub-atomic structures and processes.
16. Chemistry: Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and t interactions, danger signs, production techniques, and disposal methods.
17. Biology: Knowledge of plant and animal organisms, their tissues, cells, functions, interdependencies, and interactions with each other and the environment.
18. Psychology: Knowledge of human behavior and performance; individual differences in ability, personality, and interests; learning and motivation; psychological research methods; and the assessment treatment of behavioral and affective disorders.
19. Sociology and Anthropology: Knowledge of group behavior and dynamics, societal trends and influences, human migrations, ethnicity, cultures, and their history and origins.
20. Geography: Knowledge of principles and methods for describing the features of land, sea, and air masses, including their physical characteristics, locations, interrelationships, and distribution o animal, and human life.
21. Medicine and Dentistry: Knowledge of the information and techniques needed to diagnose and treat human injuries, diseases, and deformities. This includes symptoms, treatment alternatives, drug pro and; interactions, and preventive health-care measures.
22. Therapy and Counseling: Knowledge of principles, methods, and procedures for diagnosis, treatment, and rehabilitation of physical and mental dysfunctions, and for career counseling and guidance.
23. Education and Training: Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.
24. English Language: Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
25. Foreign Language: Knowledge of the structure and content of a foreign (non-English) language including the meaning and spelling of words, rules of composition and grammar, and pronunciation.
26. Fine Arts: Knowledge of the theory and techniques required to compose, produce, and perform works of music, dance, visual arts, drama, and sculpture.
27. History and Archeology: Knowledge of historical events and their causes, indicators, and effects on civilizations and cultures.
28. Philosophy and Theology: Knowledge of different philosophical systems and religions. This includes their basic principles, values, ethics, ways of thinking, customs, practices, and their impact on culture.
29. Public Safety and Security: Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, d property, and institutions.
30. Law and Government: Knowledge of laws, legal codes, court procedures, precedents, government regulations, executive orders, agency rules, and the democratic political process.
31. Telecommunications: Knowledge of transmission. broadcasting. switching. control. and operation of

telecommunications systems.

32. Communications and Media: Knowledge of media production, communication, and dissemination techniques and methods. This includes alternative ways to inform and entertain via written, oral, and visual media.

33. Transportation: Knowledge of principles and methods for moving people or goods by air, rail, sea, or road, including the relative costs and benefits.

39. Achievement/Effort: Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.

40. Persistence: Job requires persistence in the face of obstacles.

41. Initiative: Job requires a willingness to take on responsibilities and challenges.

42. Leadership: Job requires a willingness to lead, take charge, and offer opinions and direction.

43. Cooperation: Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude.

44. Concern for Others: Job requires being sensitive to others' needs and feelings, and being understanding and helpful to others on the job.

45. Social Orientation: Job requires preferring to work with others rather than alone, and being personally connected with others on the job.

46. Self-Control: Job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations.

47. Stress Tolerance: Job requires accepting criticism and dealing calmly and effectively with high-stress situations.

48. Adaptability/Flexibility: Job requires being open to change (positive or negative) and to considerable variety in the workplace.

49. Dependability: Job requires being reliable, responsible, and dependable, and fulfilling obligations.

50. Attention to Detail: Job requires being careful about details and thorough in completing tasks.

51. Integrity: Job requires being honest and ethical.

52. Independence: Job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done.

53. Innovation: Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems.

54. Analytical Thinking: Job requires analyzing information and using logic to address work-related issues and problems.

SKILL DOMAIN

01. Reading Comprehension: Understanding written sentences and paragraphs in work-related documents.

02. Active Listening: Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

03. Writing: Communicating effectively in writing as appropriate for the needs of the audience.

04. Speaking: Talking to others to convey information effectively.

05. Mathematics: Using mathematics to solve problems.

06. Science: Using scientific rules and methods to solve problems.

07. Critical Thinking: Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

08. Active Learning: Understanding the implications of new information for both current and future problem-solving and decision-making.

09. Learning Strategies: Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.

10. Monitoring: Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.

11. Social Perceptiveness: Being aware of others' reactions and understanding why they react as they do.

12. Coordination: Adjusting actions in relation to others' actions.

13. Persuasion: Persuading others to change their minds or behavior.

14. Negotiation: Bringing others together and trying to reconcile differences.

15. Instructing: Teaching others how to do something.

16. Service Orientation: Actively looking for ways to help people.

17. Complex Problem Solving: Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
18. Operations Analysis: Analyzing needs and product requirements to create a design.
19. Technology Design: Generating or adapting equipment and technology to serve user needs.
20. Equipment Selection: Determining the kind of tools and equipment needed to do a job.
21. Installation: Installing equipment, machines, wiring, or programs to meet specifications.
22. Programming: Writing computer programs for various purposes.
23. Quality Control Analysis: Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
24. Operations Monitoring: Watching gauges, dials, or other indicators to make sure a machine is working properly.
25. Operation and Control: Controlling operations of equipment or systems.
26. Equipment Maintenance: Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
27. Troubleshooting: Determining causes of operating errors and deciding what to do about it.
28. Repairing: Repairing machines or systems using the needed tools.
29. Systems Analysis: Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
30. Systems Evaluation: Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.
31. Judgment and Decision Making: Considering the relative costs and benefits of potential actions to choose the most appropriate one.
32. Time Management: Managing one's own time and the time of others.
33. Management of Financial Resources: Determining how money will be spent to get the work done, and accounting for these expenditures.
34. Management of Material Resources: Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.
35. Management of Personnel Resources: Motivating, developing, and directing people as they work, identifying the best people for the job.

WORK CONTEXT DOMAIN

01. How often does your current job require face-to-face discussions with individuals and within teams?
02. How frequently does your current job require public speaking? (one speaker with an audience)
03. How frequently does your current job require telephone conversation?
04. How frequently does your current job require electronic mail?
05. How frequently does your current job require written letters and memos?
06. How much contact with others (by telephone, face-to-face, or otherwise) is required to perform your current job?
07. How important are interactions that require you to work with or contribute to a work group or team to perform your current job?
08. In your current job, how important are interactions that require you to deal with external customers (as in retail sales) or the public in general (as in police work)?
09. In your current job, how important are interactions that require you to coordinate or lead others in accomplishing work activities? (not as a supervisor or team leader)
10. How responsible are you for the health and safety of other workers on your current job?
11. How responsible are you for work outcomes and results of other workers on your current job?
12. How often are conflict situations a part of your current job?
13. How often is dealing with unpleasant, angry or discourteous people a part of your current job?
14. How often is dealing with violent or physically aggressive people a part of your current job?
15. How often does your current job require you to work indoors in an environmentally controlled environment (like a warehouse with air conditioning)?
16. How often does your current job require you to work in an environment that is not environmentally controlled (like a warehouse without air conditioning)?

17. How often does your current job require you to work outdoors, exposed to all weather conditions?
18. How often does your current job require you to work outdoors, under cover (like in an open shed)?
19. How often does your current job require you to work in an open vehicle or operating equipment (like a tractor)?
20. How often does your current job require you to work in a closed vehicle or operate enclosed equipment (like a car)?
21. How physically close to other people are you when you perform your current job?
22. In your current job, how often are you exposed to sounds and noise levels that are distracting and uncomfortable?
23. In your current job, how often are you exposed to very hot (above 90°F) or very cold (below 32°F) temperatures?
24. In your current job, how often are you exposed to extremely bright or inadequate lighting conditions?
25. In your current job, how often are you exposed to contaminants (such as pollutants, gases, dust or odors)?
26. In your current job, how often are you exposed to cramped work space that requires getting into awkward positions?
27. In your current job, how often are you exposed to whole body vibration (like operating a jackhammer or earth moving equipment)?
28. How often does your current job require that you be exposed to radiation?
29. How often does your current job require that you be exposed to diseases or infection? This can happen with workers in patient care, some laboratory work, sanitation control, etc.
30. How often does your current job require that you be exposed to high places? This can happen for workers who work on poles, scaffolding, catwalks, or ladders longer than 8 feet in length.
31. How often does your current job require that you be exposed to hazardous conditions? This can happen when working with high voltage electricity, flammable material, explosives, or chemicals. Do not work with hazardous equipment.
32. How often does your current job require that you be exposed to hazardous equipment? This includes working with saws, close to machinery with exposed moving parts, or working near vehicular traffic including driving a vehicle).
33. How often does your current job require that you be exposed to minor burns, cuts, bites, or stings?
34. How much time in your current job do you spend sitting?
35. How much time in your current job do you spend standing?
36. How much time in your current job do you spend climbing ladders, scaffolds, poles, etc.?
37. How much time in your current job do you spend walking or running?
38. How much time in your current job do you spend kneeling, crouching, stooping, or crawling?
39. How much time in your current job do you spend keeping or regaining your balance?
40. How much time in your current job do you spend using your hands to handle, control, or feel objects, tools, or controls?
41. How much time in your current job do you spend bending or twisting your body?
42. How much time in your current job do you spend making repetitive motions?
43. In your current job, how often do you wear common protective or safety equipment such as safety shoes, glasses, gloves, hearing protection, hard hats, or life jackets?
44. In your current job, how often do you wear specialized protective or safety equipment, such as breathing apparatus, safety harness, full protection suits, or radiation protection?
45. How serious a mistake can you make on your current job (one you can't easily correct)?
46. In your current job, what results do your decisions usually have on other people or the image or reputation or financial resources of your employer?
47. In your current job, how often do your decisions affect other people or the image or reputation or financial resources of your employer?
48. In your current job, how much freedom do you have to make decisions without supervision?
49. How automated is your current job?
50. How important to your current job is being very exact or highly accurate?
51. How important to your current job are continuous, repetitious physical activities (like key entry) or mental activities (like checking entries in a ledger)?
52. How much freedom do you have to determine the tasks, priorities or goals of your current job?
53. How competitive is your current job?
54. How often does your current job require you to meet strict deadlines?
55. How important to your current job is keeping a pace set by machinery or equipment?
56. How regular is your work schedule on your current job?

57. How many hours do you work in a typical week on your current job?

ABILITY DOMAIN

01. Oral Comprehension: The ability to listen to and understand information and ideas presented through spoken words and sentences.
02. Written Comprehension: The ability to read and understand information and ideas presented in writing.
03. Oral Expression: The ability to communicate information and ideas in speaking so others will understand.
04. Written Expression: The ability to communicate information and ideas in writing so others will understand.
05. Fluency of Ideas: The ability to come up with a number of ideas about a topic (the number of ideas is important, not their quality, correctness, or creativity).
06. Originality: The ability to come up with unusual or clever ideas about a given topic or situation, or to develop creative ways to solve a problem.
07. Problem Sensitivity: The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing that there is a problem.
08. Deductive Reasoning: The ability to apply general rules to specific problems to produce answers that make sense.
09. Inductive Reasoning: The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
10. Information Ordering: The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
11. Category Flexibility: The ability to generate or use different sets of rules for combining or grouping things in different ways.
12. Mathematical Reasoning: The ability to choose the right mathematical methods or formulas to solve a problem.
13. Number Facility: The ability to add, subtract, multiply, or divide quickly and correctly.
14. Memorization: The ability to remember information such as words, numbers, pictures, and procedures.
15. Speed of Closure: The ability to quickly make sense of, combine, and organize information into meaningful patterns.
16. Flexibility of Closure: The ability to identify or detect a known pattern (a figure, object, word, or sound) that is hidden in other distracting material.
17. Perceptual Speed: The ability to quickly and accurately compare similarities and differences among sets of letters, numbers, objects, pictures, or patterns. The things to be compared may be presented at the same time or one after the other. This ability also includes comparing a presented object with a remembered object.
18. Spatial Orientation: The ability to know your location in relation to the environment or to know where other objects are in relation to you.
19. Visualization: The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
20. Selective Attention: The ability to concentrate on a task over a period of time without being distracted.
21. Time Sharing: The ability to shift back and forth between two or more activities or sources of information (such as speech, sounds, touch, or other sources).
22. Arm-Hand Steadiness: The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
23. Manual Dexterity: The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
24. Finger Dexterity: The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
25. Control Precision: The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
26. Multilimb Coordination: The ability to coordinate two or more limbs (for example, two arms, two legs, or one leg and one arm) while sitting, standing, or lying down. It does not involve performing the activities while the whole body is in motion.
27. Response Orientation: The ability to choose quickly between two or more movements in response to two or more different signals (lights, sounds, pictures). It includes the speed with which the correct response is started with the hand, foot, or other body part.
28. Rate Control: The ability to time your movements or the movement of a piece of equipment in anticipation of changes in the speed and/or direction of a moving object or scene.
29. Reaction Time: The ability to quickly respond (with the hand, finger, or foot) to a signal (sound, light, picture) when it

appears.

30. Wrist-Finger Speed: The ability to make fast, simple, repeated movements of the fingers, hands, and wrists.
31. Speed of Limb Movement: The ability to quickly move the arms and legs.
32. Static Strength: The ability to exert maximum muscle force to lift, push, pull, or carry objects.
33. Explosive Strength: The ability to use short bursts of muscle force to propel oneself (as in jumping or sprinting) or to throw an object.
34. Dynamic Strength: The ability to exert muscle force repeatedly or continuously over time. This involves muscular endurance and resistance to muscle fatigue.
35. Trunk Strength: The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without "giving out" or fatiguing.
36. Stamina: The ability to exert yourself physically over long periods of time without getting winded or out of breath.
37. Extent Flexibility: The ability to bend, stretch, twist, or reach with your body, arms, and/or legs.
38. Dynamic Flexibility: The ability to quickly and repeatedly, bend, stretch, twist, or reach out with your body, arms, and/or legs.
39. Gross Body Coordination: The ability to coordinate the movement of your arms, legs, and torso together when the whole body is in motion.
40. Gross Body Equilibrium: The ability to keep or regain your body balance or stay upright when in an unstable position.
41. Near Vision: The ability to see details at close range (within a few feet of the observer).
42. Far Vision: The ability to see details at a distance.
43. Visual Color Discrimination: The ability to match or detect differences between colors, including shades of color and brightness.
44. Night Vision: The ability to see under low-light conditions.
45. Peripheral Vision: The ability to see objects or movement of objects to one's side when the eyes are looking ahead.
46. Depth Perception: The ability to judge which of several objects is closer or farther away from you, or to judge the distance between you and an object.
47. Glare Sensitivity: The ability to see objects in the presence of a glare or bright lighting.
48. Hearing Sensitivity: The ability to detect or tell the differences between sounds that vary in pitch and loudness.
49. Auditory Attention: The ability to focus on a single source of sound in the presence of other distracting sounds.
50. Sound Localization: The ability to tell the direction from which a sound originated.
51. Speech Recognition: The ability to identify and understand the speech of another person.
52. Speech Clarity: The ability to speak clearly so others can understand you.

B. Comments from the Association of Computer-Based Systems for Career Information

COMMENTS FROM THE TECHNICAL WORKSHOP

“Using the New Labor Exchange Skills in CIDS” presented on December 9, 2002 at the Conference for the Association of Computer-Based Systems for Career Information

1. Workshop Purpose

The workshop was developed to help the Career Information Delivery Systems (CIDS) become familiar with the Work Activities otherwise known as Labor Exchange Skills and Work Content statements and identify how they can use them within their delivery systems.

2. Naming the Statements

- **Do you think the title “Specific Work Activity” is a good description for these statements? Do you think the title will be meaningful (clear) to your customers?**
- **Pick one of the occupations and examine the work activities. List an example of how these work activity statements fit appropriately between a task and a GWA.**

Participants indicated that the title “specific” implies non-transferable and does not highlight the common language that these statements provide for use across occupations. Rather tasks equate specific work activities and some systems already describe tasks as “specific” descriptors. Some respondents indicated that another title might be more appropriate. Participants also indicated that a definition/description should be included with the title especially when dealing with students. However, some respondents approved the title “Specific Work Activity” as it reflected the detail of these statements in comparison to the more general Work Activities.

Respondents noted that the statement varied in their level of specificity. In some instances, these work activities were more specific than the task statement (e.g. Cost Estimator – swa4761 and GWA 27). Participants also noted that the reading level might be too advanced and wording changes might be necessary (e.g. adjudicate). Overall, the statements were found to have great potential for transferability.

3. Integration with other O*NET information

- **Do you think it would be a good idea to have these work activity statements as part of a career delivery system?**

These statements provide useful information not currently provided. Respondents indicated they are interested in incorporating them into their systems. Some participants indicated that they would like to use these statements for specific applications instead of providing another set of occupational descriptors. These statements have special potential for resume development, analysis of transferability of occupational experiences for career transition, training program searches to help workers meet career goals, and to generate learning plans.

4. Uses

- **Identify 3 to 5 examples of how your customers could use these work activity statements**

Participants consistently identified the following applications of the statements (sorted by user type).

Job Seekers/Displaced Workers

- Building a resume
- Identifying transferable skills/commonality across occupations
- Isolating what a number of occupations have in common
- Helping a displaced worker articulate what they did in a previous job

- Helping people who are talking about the same thing use the same terminology

Organizations

- Defining job openings and writing job descriptions/orders – using a common language
- Developing the common knowledges/skills required across occupations that can be used for performance review etc.

CIDS

- Replacing some of the more complicated task statements with these statements

Student/Career Counselor

- Advising students on what they would be required to do in a job and for career guidance on fields of study
- Helping seekers name skills they possess as preparation for a job interview
- Helping to reinforce the work requirements that tend to be overlooked by career descriptions (e.g. Vocational Ed teachers - grammar and punctuation)
- Identifying where (occupations) students can apply their knowledge (a way to relate school to work)
- Exploring careers in a general manner

Teachers

- Helping teachers with program planning and curriculum development

Analysts

- Helping job analysis in the area of vocational rehabilitation

5. Promoting the Statements.

- **How would you explain this information to your users?**
 - **What will you promote about them?**

Respondents indicated that the statements would be most utilized if there were tailored applications explaining how these statements could be used (see above). Usability would be increased if each application (e.g. writing job orders) had a defined process. The more vague or open the uses appear the less likely they would be used. These participants indicated they would like to incorporate them into their yearly change cycle in September. Overall, the participants would promote and market the following aspects of the statements.

- They are an improvement to the Content Model general Work Activities because they provide more descriptive information
- They can be linked to programs of study
- They provide a real world view of what is required for an occupation

Respondents would like more information on how the statements relate to the Content Model general Work Activity elements.

6. NEXT STEPS.

- **List 3 things about the work activities, in their order of priority, which you would like to see addressed in the future.**

Participants reported the following priorities for their users.

- Perform hierarchical clustering to help reduce the number of statements for manageability.
- Continue to actively communicate with others to promote development and use of a common language
- Conduct incumbent research to validate the statements
- Provide user friendly definitions for variables used in O*NET and explain the relationships between them
- Ensure that every occupation is complete in statement coverage
- Relate the statements to training programs
- Assign level of importance of each SWA for each occupation

- Examine occupations that have too many statements – examine whether the occupation is too broad vs. the statements are too specific. Identify what “too many statements” means. Identify what the appropriate number of statements are
- Develop a tool that demonstrates transferability
- Map work activities to school subjects and help determine what courses to take (relate them to academic programs)
- Connect activities to education programs of study
- Make available an executive summary explaining the history of the statement to provide additional information to those interested
- Link the statements to Knowledges to understand how students can apply what they learn through educational programs

7. Establishing a Hierarchy.

- **In a Feedback Survey, it was reported that the number of statements (2345) might be unmanageable for users, especially students. Would a hierarchy that groups the work activities into fewer categories be helpful to your users?**
 - **Would your users feel comfortable drilling into layers of hierarchy in order to retrieve more detail about the occupation? How many categories to begin with? How many layers to drill down?**

Overall, participants indicated that a hierarchy that groups the statements into fewer categories would be useful. Two layers would be the maximum number manageable for users. It was suggested that this structure should be built upon an existing structure like GWAs. Suggestions for how to group the activities include by:

- Sub occupation
- Content Model general Work Activities
- Function
- Dept of Education Career Clusters