

O*NET and Workforce Development
Assessing Opportunities

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Acronyms and Abbreviations

BLS	Bureau of Labor Statistics
CIP	Classification of Instructional Programs
DOL	Department of Labor
IPEDS	Integrated Postsecondary Education Data System
NAICS	North American Industry Classification System
OSDS	Occupational Supply Demand System
QCEW	Quarterly Census of Employment and Wages
SOC	Standard Occupational Classification
STEM	Science, Technology, Engineering, and Mathematics

Introduction

This paper is in response to the O*NET Panel of the National Academy of Sciences and its undertaking of a review of how various customer groups use the O*NET system and whether improvements can be made to better-serve customers' needs. The authors focused on the applications of O*NET for Workforce Development activities across the states. In so doing, we sought the input of users, particularly state Labor Market Information Directors and their familiarity and understanding of O*NET uses in a workforce development environment.

Although critique is offered throughout the text to follow, it is always done from the perspective of offering opportunities for enhancement to O*NET and increasing its utility and application to workforce development. There is universal recognition of the need for a relational database of occupational descriptors as a key foundation to workforce development efforts. The objective of this paper is continued support and development of O*NET as a centerpiece for interaction and informed choice across the workforce development community.

Below is an examination of O*NET's relative strengths and weaknesses from a workforce development perspective. When dealing with mass layoffs, developing occupational or skills-based projections, or advising training providers on how to use limited resources, how can professionals use O*NET and how can it be improved?

O*NET is not intended as a data set, at least not akin to other workforce development professionals' resources, such as employment counts or occupational projections. Nor is it simply a classification system for occupations, skills, or anything else, though taxonomy certainly plays an important role. Rather, it is a method of denoting how various **descriptors** within the broader workforce interact with one another, these descriptors being skills, abilities, occupations, knowledge sets, experience, education, employment outlooks, and other labor market facets, each with its own taxonomy and relationships to other descriptors.¹

Unfortunately, the clarity of definition in the above has been lost with the proliferation of O*NET products and web site applications. This is particularly true for the general workforce development practitioner. Part of this is due to marketing mishaps where each product is overly associated with being O*NET, as opposed to merely using or applying O*NET. The original marketing slogan of "O*NET in it" has not been adhered to or has otherwise been lost on the general workforce development public.

More importantly, this suggests that clarity of purpose may be best achieved through separation of functions. Those functions of collecting data and defining a relational database are probably best accomplished if kept separate and distinct from application development. The expertise and talents for each are quite distinct and separation ought to increase the clarity of communication and marketing and increase the overall use and perception of integrity of O*NET within the workforce development system. A few people suggested that O*NET, as a data collection effort and relational database, ought to be housed in a statistical agency. Although universal agreement is unlikely on this issue, the authors suggest two possibilities to address this general issue.

¹ "The O*NET Content Model," O*NET Resource Center, <http://www.onetcenter.org/content.html>.

First, the data definitions, collection and provision of a relational database might best move forward through establishing a steering or an advisory committee. With a known membership and representative procedure, the process of input and response could become more formalized and apparent. Such a body could guide input and communicate decisions in respect to O*NET enhancements. This approach provides O*NET developers a single objective and allows them to focus on what they do best, which is scientifically reporting characteristics and requirements of occupations.

Second, there is a real need to market, train and push capacity to apply the O*NET database at state and regional levels. This is critical to address the regionally specific issues of workforce development and fully utilize the database to inform the communications and decisions of workforce development, economic development and education at the local level. More importantly, the Labor Market Information network and workforce development community have ready access to other information, such as employment by occupation, wages, training program completions and occupational projections, that are essential information components in conjunction with O*NET for informed workforce development at a state and regional level. A formal Employment and Training network already exists but needs to be more fully engaged. Although lacking specifics on structure and process, there were consistent statements to the effect that we need interstate teams to address capacity for application development across the states. Such engagement could guide the development of application tools that are not overwhelming to all but the most sophisticated users, a common criticism of O*NET web products. O*NET On-line and the O*NET Summary Report tend lose the intent of the initial inquiry in a mountain of information – not a targeted application tool.

The objective would be to focus some O*NET or other resources to researching ways to aid states in delivering information to the workforce development community and their individual customers. A platform to begin to share information resources might be the incorporation of features of the O*NET database within the Workforce Information Database. Since other state tools are built around the Workforce Information Database, this is a logical starting point to supporting states as a more effective and efficient way to deliver informed choice to their job seeking customers.

It is important to remember that from a workforce development perspective, O*NET is a tool to link one set of workforce statistics to another, thereby expanding the usefulness of existing data sets, such as QCEW employment counts or ten-year job outlooks, and providing a framework for understanding the local labor market. As we will see later in this paper, this linking action is O*NET's most valuable contribution to workforce development, essentially translating current liabilities in the workforce, such as dislocated workers or difficult-to-fill occupations, into potential solutions—identifying idled workers' hidden skills or creating a road map for meeting future skilled labor needs.

Crosswalks and Links – The Essence of O*NET

For the workforce development professional, the various crosswalks between O*NET and other data sources and the crosswalks that connect O*NET's numerous internal descriptors are of paramount importance and deserving of the most scrutiny when examining strengths and weaknesses.

In the first case, O*NET has little value in workforce development unless it is connected with other information such as occupational employment levels, wages, educational training and industry and occupational information, including employment projections. As such, it is critical that O*NET, the SOC system and the CIP are encouraged to move in a coordinated fashion. In particular, there should be a formal effort to coordinate on definitions or classification schema. A current problem is the use of divergent definitions and characterization of educational levels, attainment and their descriptors. Even if there are program pressures and needs to move in distinct directions between these systems, there ought to be a core structure across which the systems are unified. Since the Bureau of Labor Statistics captures so much data around the NAICS and the SOC, these would lend themselves as a core for unification of the systems. For example, if O*NET finds it necessary to break out occupations beyond the SOC definitions, it would be advisable to maintain some rollup to the SOC classification to capture the additional non-O*NET data required for workforce development. Without linkages to other data systems through crosswalks, new O*NET occupations alone offer little to workforce development efforts.

An immediate concern in this regard is the need to update the O*NET/CIP crosswalk given ongoing revisions in each system. It is very difficult to provide reasonable and informed advice about training options for the adult workforce or to propose rational training investment options to the workforce development community without drawing linkages to instructional programs of study.

The second point related to crosswalks and links involves O*NET's internal structure and its ease of understanding and meaning in the applied world of workforce development. O*NET maintains a database showing which descriptors relate to each and the degrees to which they do so. For example, the database notes that the "registered nurses" generalized occupation relates to the "biology" required knowledge set (among others). This link includes a measure of how crucial the biology knowledge set is, on average, in the occupation (**importance**, on a scale of 1 to 5) and another measure of how deep that knowledge needs to be (**level**, on a scale of 1 to 7). The foundations for these coefficients are from a survey conducted by the DOL and the Research Triangle Institute, asking employers and workers about the skills they use.

One common complaint among workforce development professionals is these descriptors are not always adequately defined. It is not clear for many users what differentiates a 1 from a 4 in the importance score. The problem can be more pronounced with level scores. Each descriptor has its own scoring rubric and may cover widely divergent workplace competencies. As an example, consider the "biology" knowledge set mentioned above. An upper level of the rubric requires the ability to investigate the effects of pollution on marine plants and animals, while a lower level only requires the ability to feed domestic animals. This lower level score would hardly be considered biological knowledge by most lay people. More troubling, none of the levels of

biological knowledge between these two divergent points have any rubric descriptors, so it is up to the survey respondent to choose a value. This could lead to unreliability in the descriptor measurement. In general, both the descriptor definitions and the scoring rubrics need to be more explicitly spelled out to improve measurement reliability.²

One popular product linking occupations with their descriptors is the development of skill-based assessments. Taking a count of occupational employment, either from employment projections, job vacancy survey results, or some other dataset, analysts can use the descriptor links in O*NET to create an inventory of skills, knowledge sets, work activities, or any number of other labor traits. The Projections Workgroup has developed a Skills-Based Projections web application that allows analysts to take employment projections and convert them to a list of future required skills.³ Also, as we will see later, these skills assessments can play an important role in responding to mass layoffs.

How important and how advanced does a descriptor have to be before it can be considered related to an occupation and, therefore, fit for inclusion in a skills inventory? In theory, all descriptors are related to all occupations, if only faintly. The O*NET database contains a lot of importance and level scores of only 1, for occupation-descriptor links. The Skills-Based Projections web application mentioned above uses an importance score of 3.0 and a level score of 4.0 as default cutoff values when conducting analyses, but analysts may alter these settings.⁴ Some agencies take a “top ten” approach to selecting descriptors. Assuming improvements in scoring rubrics as discussed earlier, a good next step would be to issue guidelines for deciding which occupation-descriptor links are sufficiently prominent for skills accounting. This is where the rubber hits the road in workforce development and is the area of most central importance and in need of attention in the advancement of O*NET from a workforce practitioner’s perspective.

There is systemic strain across the workforce development community surrounding the degree to which O*NET skills need to be **occupational** or **job** specific and the degree to which O*NET ought to be **centrally** vs. **locally** delivered. To some extent, the authors see the addition of Tools and Technology as an effort to address the need for more job-specific information. In this vain, one stream of thought is that O*NET needs to work more concertedly with Labor Market Information Directors and workforce information specialists to define more meaningful classification of skills for specific applied settings. The critical needs for workforce development are skill transferability and skill gap assessment tools associated with appropriate training options. Since Generalized Work Activities are the most closely related to job-specific tasks, a *work activities assessment tool* (similar to the Ability Profiler) might be developed as a measure of skill transferability. Similarly, the revival of something akin to the O*NET beta version of *Match Occupations*, with numerical “fit” level ratings, would aid in skill gap analysis.

² Of course, making the rubrics more specific carries its own problems. A single descriptor—even a single level—might encompass a wide range of specific workplace abilities. Going back to the biology example, higher levels would need to measure several divergent specializations in the biological sciences, from animal husbandry to virology. To cover every possible competency in the labor force would require a prohibitively-large number of descriptors. As in any taxonomy, some summary and aggregation is necessary.

³ “Skills-Based Projections,” *Projections Workgroup*, <http://dev.projectionscentral.com/sbproj/sbprojections.asp>.

⁴ Disappointingly, many state publications that use skills-based projections do not explicitly state their cutoff values.

The other stream of thought encourages capacity building at the state and regional level to customize applications themselves. The thinking is that a national system cannot succeed in creating a skill classification that universally captures all the unique needs of a region or industry groupings. Also, they see the interactions in preparing such detailed skill analysis or detailed work activities as the very vehicle for uniting business, education, economic and workforce development in full partnership at the regional level. States already have a portfolio of workforce development tools. Rather than sending customers to an outside tool with different design and navigation, the information would more likely be used in a constructive and successful manner if it were incorporated into tools and products that states readily market and use. Again, a platform to begin to share information resources might be the incorporation of features of the O*NET database within the Workforce Information Database.

The authors do not offer advice on the choice between the **occupational** vs. **job** specific nor the **centralized** vs. **local** delivery issues here. However, these issues cannot go unresolved as O*NET evaluates its planning and direction going forward. To ignore these issues would generate frustration and failure in any future development and delivery of O*NET.

Special Selections – Beyond Ad-Hoc Groupings

O*NET’s occupational classification system is based largely on SOC, where occupations are grouped based on “the work performed, skills, education, training, and credentials.”⁵ In fact, most classifications are exactly the same in the two taxonomies. But a growing number of analysts are designing and using special occupational clusters to capture certain segments of the labor force, such as up-and-coming industries, emerging production techniques, educational levels, or hard-to-fill positions, along with those occupations that are simply expected to grow a great deal in the next ten years.

While in theory any analyst can set up an ad-hoc cluster of occupations as they require (and they often do), O*NET Online has created several predefined groups of occupational clusters. There are 16 In-Demand Industry Clusters representing occupations in industries that are “economically important, projected to have long-term growth, or are being transformed by technology and innovation”; five Job Zones covering required “education, experience, and training”; sixteen Career Clusters grouping occupations “in the same field of work that require similar skills”; and eight STEM clusters of occupations requiring education and training in STEM-related fields.

The most common complaint we have heard in conversations with other state workforce development agencies is the mystery surrounding the methodology for creating these clusters, especially the In-Demand occupations. Many of these methodologies have been taken in whole from other DOL agencies or outside research organizations, but solid selection criteria are elusive. One correspondent even questioned whether the In-Demand label may be misleading for job seekers, who would see the label and automatically assume it was a good field to enter, and noted that a full review of In-Demand occupations may be in order in light of the recent economic downturn. At the least, selection criteria should be more accessible for analysts. It may

⁵ U.S. Bureau of Labor Statistics, *Standard Occupational Classification User Guide*, <http://www.bls.gov/soc/socguide.htm>.

also be worthwhile to periodically review In-Demand clusters and revisit whether they are still hot fields.

Another frequent comment regarded O*NET's use of Job Zones when describing occupations. Some felt the zones were far too broad to be of any real use. Unlike the education and training levels used in BLS publications,⁶ Job Zones make no differentiation between on-the-job training, postsecondary education, or nontraditional pathways such as apprenticeship, nor is there any mechanism for recognizing multiple acceptable training ladders. The five existing Job Zones may be sufficient for giving workers a general idea what type of training may be required of them, but they are not enough for any serious analysis. This shortcoming may be corrected in part through knowledge and/or education descriptors, but, as will be discussed later, it is not quite a perfect solution.

Direct Job Development – Linking Skills with Employers

As mentioned earlier, one common use for the O*NET framework is to develop a list of associated skills, knowledge sets, and work activities from a set of occupations. This is useful in determining what a specific group of workers is able to do, not only in their current positions but also in potentially related occupations. Using associated descriptors to find related fields can be a valuable tool when dealing with displaced workers.

Consider a common situation where a large factory is forced to close, laying off several hundred skilled workers in assorted occupations. Many have worked at the factory for their entire careers and have no idea what else they can do. Without O*NET, workforce professionals' best option was to develop a list of displaced occupations from this closure. Then, going through each occupation individually, analysts would use occupational crosswalks to find other industries where these occupations might be employed and, cooperating with other establishments in these industries, provide the workers referrals to other firms where they might find work. While this method may indeed help displaced workers find new employment, it has serious weaknesses. In an economic environment such as this, where entire industries and, in some parts of the country, entire sectors are in steep decline, there may not be an apparent "escape route" for laid-off workers. Further, the old method assumes no change in workers' occupations. If someone worked as a team assembler, the system simply attempts to find another team assembly job, without asking whether he or she could do something else.

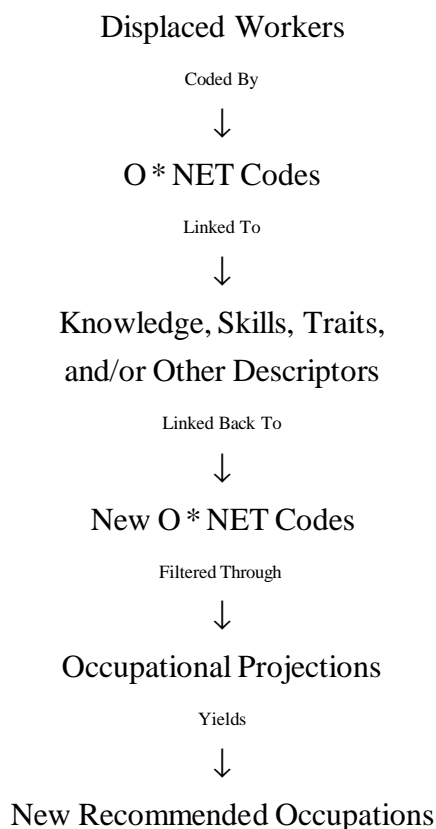
As Figure 1 on the next page shows, O*NET allows workforce development professionals to go a step deeper—peeling back occupational titles to see their underlying skills and work activities and thereby connecting to new related occupations. We start as we did before, with a list of displaced occupations. (Analysts may need to take time to validate the data, converting lay job titles into O*NET or SOC classifications. O*NET Online provides a helpful tool to accomplish just that. Also bear in mind that some closing companies are not always cooperative when asked what kinds of workers are being laid off.)

⁶ The BLS is in the process of revising its education and training level definitions. It recently finished accepting public comment on the topic and should publish final guidelines later this year.

Instead of going to an industrial crosswalk, analysts would next use descriptor links to develop a picture of which knowledge, skills, and activities the workers have generally mastered.⁷ Using this descriptor profile, analysts can then link back to occupations to find potential careers. Developing a “menu” of possible occupational alternatives can help displaced workers make decisions on whether to retire, relocate, go back to school, or switch industries.

Figure 1 includes one final step for the sake of due diligence, checking proposed occupations against local occupational projections. A conscientious workforce development professional should, upon deriving a list of recommended occupations, look at ten-year outlooks and net projected openings to make sure there is indeed a future in the careers chosen.

Figure 1: Using O*NET to Transfer Displaced Workers’ Skills



While discussing comparisons with SOC-based employment levels (as is the case with most occupational employment projections), it is important to note that not all O*NET-classified occupations match perfectly with SOC definitions. O*NET classifications can be more detailed, requiring analysts to roll up when translating to SOC. Database entries rolled up to the six-digit level would enable analysts to more directly and accurately match SOC occupations to O*NET’s network of descriptors.

⁷ There is some danger in being *too* general in applying descriptors to a group of displaced workers. These descriptors, especially as they relate to day-to-day activities on the job, can vary significantly, and some individual workers may have more talent in certain skills than others.

Some private consulting firms have added refinements to the process in Figure 1. One example is Workforce Associates' Transferable Occupation Relationship Quotient (TORQ™), which focuses more on skills' transferability between occupations, rather than just level and importance.⁸ The State of Indiana has contracted for TORQ™ analysis on a few occasions and met with some success.

Finally, state workforce agencies might want to consider incorporating linked skill and knowledge attributes into their online labor exchanges. Through the O*NET coder, job orders can be assigned a classification which allows for electronic sorting, description and analytical assessment of the electronic job market. Although such electronic coding routines are not fully accurate, they allow for a degree of summary that is not otherwise available. Similarly, job seekers might be coded based on their last job or job history, allowing for some finer assessment of labor availability vs. job openings.

Training Investments – Developing Targeted Efforts

Most state workforce development agencies realize that robust postsecondary training and education efforts are crucial for preparing their labor forces for the future economy, encouraging economic development, and battling poverty and economic distress. How can states use limited resources wisely and ensure that education efforts match real market demand? As before with skills and displaced workers, the O*NET Content Model offers the capability to link educational programs with occupational projections.

Figure 2 on the next page shows a model of using education descriptors to project training needs, an approach sometimes called human capital accounting. Bear in mind that the current version of the O*NET database has not yet implemented links with educational descriptors. (In their work along these lines, state analysts have used the OSDS.) This model assumes links with educational programs, classified by CIP code.

Beginning with annual net projected openings from ten-year occupational projections, analysts would link to associated training programs to create an inventory of required postsecondary degrees. Degree types and in which fields will vary depending on the state's individual occupational profile.

Analysts should next take some time to correct for miscounts. To start, our studies have shown that of those completing a training program in Ohio, about 15 to 25 percent do not enter state or local labor markets, through failure to pass licensing exams, health problems, family obligations, leaving the state, or other reasons.⁹ On the other side of the coin, newly minted program completers will be in competition with existing trained workers and those migrating from other parts of the country. Also, realize that for many occupations, formal structured education and

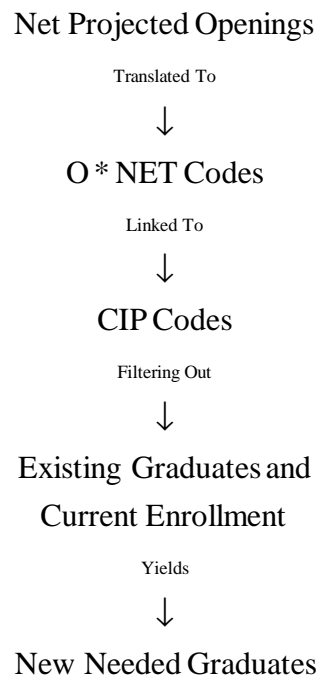
⁸ Workforce Associates, Inc., *TORQ*, <http://www.workforceassociates.com/torq.html>.

⁹ The exact participation rates may vary depending on the occupation, industry sector, and nonmarket factors such as licensing exams. See Ohio Board of Regents, *The Performance Report for Ohio's Colleges and Universities, 2006* (Columbus, OH: State Printing & Mail Services, 2007), 36. http://regents.ohio.gov/perfrpt/2006/Performance_Report_2006_final.pdf.

training, as would be measured through IPEDS or other educational tallies, may not be the only, or even the primary, pathway into employment. In total, workforce development professionals must be careful not to undercount or overcount the total human capital within the labor market.

The end result should be an accounting of how many training awards will be needed to meet projected need in the labor market, allowing for underutilization and alternate occupational entry methods. This tool, though useful, has its weaknesses. Workforce development professionals should be careful to check any conclusions made through this method against other analysis tools (e.g., longitudinal occupational wages or graduate follow-up studies) before making any firm conclusions.

Figure 2: Using O*NET with Human Capital Accounting



As is typical for displaced workers in a recessionary period, many are choosing to return to school, either to learn a new trade or keep their existing skills current. Use of the linked occupational descriptors along with occupational projections are enabling One-Stop staff to provide crucial intelligence on which skills and educational programs would be best for the future job market.

Conclusion

This paper deliberately tried to avoid presenting specific state or regional applications or overall best practices in approach or systems. Rather we felt the O*NET Panel review is best served by articulating the underlying workforce development issues that states must address, the significance of O*NET to that role, and the fundamental issues needing attention for the future development and growth in the application of O*NET.

The authors had significant input from across the states and the workforce development community. We thank them and list major state contributors below. Although we attempted to remain true to all input and represent all content in an honorable manner, we recognize the somewhat subjective nature of this review process and hold ourselves solely responsible for any conclusions drawn here. Our goal has not been to resolve issues but rather to highlight them for ongoing discussion and long term advancement of O*NET for applied workforce development. We encourage further and continued engagement of the workforce development community in this endeavor.

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