

## **Discussion of SkillTRAN Reliability, Validity, and Economic Data**

For customers of SkillTRAN and other interested parties, the following information is provided for purposes of building a better understanding of commonly asked questions about the utility of SkillTRAN products and software, particularly regarding Transferable Skills Analysis (TSA) and its labor market information methods and other resources. Topics include:

- I. Scientific Process
- II. Reliability
- III. Validity
- IV. Error Rates for Wage and Employment Numbers
- V. SkillTRAN Employment Estimate Method
  - Full-Time / Part-Time Employment
- VI. Peer Review
- VII. Variation Among Search Methods
- VIII. Daubert Criteria
- IX. Bottom Line
- X. References

### **I. Scientific Process**

The 1977 Dictionary of Occupational Titles [DOT] (DOL, 1977) was coded in such a way to permit computerization. SkillTRAN acknowledges the landmark contribution of Drs. McCroskey, Wattenbarger, Field and Sink through their creation, publication, and subsequent popularization of the Vocational Diagnosis and Assessment of Residual Employability (VDARE, 1977). Time has shown it to be the core scientific foundation to approach the challenging issue of transferable skills analysis. The VDARE process uses the DOT to capture prior work history, list the vocational details of each prior occupation, and summarize the past maximum capabilities demonstrated by the worker through past work. Further, VDARE provides a structured approach to record the limiting factors caused by disability or other issues and the subsequent post-injury profile of residual employability. From this point, searches for suitable alternate employment can be done.

Many computer systems were developed to address this challenging issue. All of those systems followed the same VDARE-style process to record and summarize work history and to develop a post-injury profile of residual ability. However, each of the systems took a different approach with regard to the search mechanism. The programs that followed the Code of Federal Regulations [CFR] definition for transferability of skills for the U. S. Social Security Administration [SSA] became known as the “Classic Model of TSA.” This model focuses primarily on Work Fields, SVP, and MPSMS for its search filters. It is now widely used in many industries. Details about how this is deployed in various SkillTRAN products are available at <http://www.skilltran.com>

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The earliest known works to carefully examine definitions and processes for transferability of skills emerged from work done by the US Department of Labor (DOL) in its management of unemployment claims. Sidney Fine (1957a, 1957b) wrote several seminal articles outlining the use of Work Fields, SVP, and MPSMS in the TSA process. Fine's primary concern in transferability issues was not to waste knowledge skill sets and valuable human capital or delay its productive use because of unnecessary training or retraining. Rooted in Functional Job Analysis (FJA), Fine saw Work Fields, SVP, MPSMS, and Data-People-Things as the important elements in the proper approach to assessing transferable skills. Definitions for all these variables used in the FJA approach to construct the DOT are contained in the *Revised Handbook for Analyzing Jobs* [RHAJ] (DOL, 1991b) and the original *Handbook for Analyzing Jobs* [HAJ] (DOL, 1972).

SkillTRAN uses Work Fields (RHAJ, Chapter 4) to represent the work activities of occupations. The use of machines, tools, equipment, and work aids often accompany the specific narrative statements of tasks typically performed by a worker in a particular occupation. Job analysts at DOL assigned Work field(s) to each DOT occupation to best summarize the narrative description. DOL also assigned MPSMS code(s) (RHAJ, Chapter 5) to reflect the **M**aterials used by the worker, the **P**roducts produced by the worker, the **S**ubject **M**atter considered, and/or the **S**ervices delivered by the worker. Study of these critical code systems should reasonably establish **content validity** for the purpose of analyzing transferable skills as defined in the CFR. Elliott (1983) as cited in Botterbusch (1986, p. 4) states "True transferable skills analysis must be based on MPSMS (i.e. Materials, Products, Subject Matter, and Services) and Work Fields." Dunn (1999) also recognized the value of searching other code systems when additional questions emerge about other, somewhat related, potential occupations given a person's residual capacities to learn and perform a new occupation.

In 2012, Dunn asserted the continuing relevance of Work Fields, SVP, and TSA in the transferability analysis process.

### **II. Reliability**

**Reliability** is a measure of the consistency of a test, method, procedure or process. When any of these is repeated multiple times, how often the same results are produced is reliability.

Reliability studies of computer software are an essential part of the software developer's quality assurance process. SkillTRAN's process for analysis of transferable skills follows a clearly defined set of programmed computer code. An advantage to computer programs is that when a computer receives data, it will repeatedly follow the same exact programmed steps each time the process is initiated. If the same data is entered each time (e.g., work history and post-injury restrictions) and the same process is requested (e.g., TSA), then the output of the computer program will be the same. The output may change, however, if underlying data files used in the process have been altered such as the Dictionary of Occupational Titles [DOT] (1991a), worker characteristics, employer listings, wage data, employment numbers, etc. When the underlying data files are held constant (unchanged), then the TSA search process is 100% reliable (i.e.,

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consistent). SkillTRAN conducts extensive quality assurance testing prior to the release of any of its new or modified products and compares performance and results to similar products in its product line and to original government data sources to assure reliability.

### **III. Validity**

**Validity** is a measure of the ability of a test, method, procedure or process to estimate a desired performance or result. Some types of validity most often mentioned in quantitative research:

- Criterion-referenced or Predictive validity (Does a process estimate or predict something accurately?)
- Concurrent validity (How well does a process correspond with an existing, proven process?)
- Content validity (How well does a process fit defined criterion?)
- Construct validity (Does a process measure what it is supposed to measure?)
- Face Validity (Does a process or method look like it will do what it is supposed to do?)

Any validation study of computer software should be fairly narrow. As a set of programmed computer code, validation should assure that a computer-based process closely follows a prescribed manual process. In the case of SkillTRAN TSA searches, great care has been taken to assure strict adherence to the Code of Federal Regulations [20 CFR 404.1568(d)]; specifically, the definition for “Transferability of Skills” used by the SSA 1-3 million times per year in its disability adjudication decisions since 1980. As a criterion reference, this federal law is very explicit.

Using the transferable skills technology it developed for the U.S. Social Security Administration (SSA), SkillTRAN’s predecessor (George M. Watters of Ability Information Systems) built a highly specialized computer program in the mid-1980s called VARS, the Vocational Adjudication Rehabilitation System. In a multi-year, multi-state study of Computer Assisted Vocational Evaluation (CAVE) systems (SSA, 1987), VARS was shown to emulate the manual process followed by disability examiners at Steps 4 and 5 of its 5-Step process of the SSA sequential evaluation process. The thousands of cases processed by VARS and by a manual control group showed identical rates of allowance and denial at Steps 4 and 5. Such a result supports **essentially identical concurrent validity** of the VARS process with the SSA manual process. The study was designed to examine faster case processing rather than validity, so no special calculations were done beyond reporting of percentages of claims decisions, test vs. control. Quality review by an independent internal SSA review process showed substantially fewer disagreements with the cases processed by VARS than with vocational evaluation cases that had been manually processed by regular SSA staff.

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**Predictive validity** is outside the realm of computer programs for TSA. While there are good benchmarks worth studying such as occupation or job family at case closure, wage at closure, and placeability (Dunn, 1999), there are too many uncontrollable external variables that influence the achievement of alternate employment. Dunn studied successful placement outcomes of 136 state vocational rehabilitation cases. He found that about one half of the successful placements had a direct or generally similar relationship of Work Field and MPSMS codes between prior work history and DOT occupation at case closure. While Work Field was the better predictor of case outcome, for this case study, more than half of the cases chose an occupation for reasons other than similarity to past work. State rehabilitation agencies are known to encourage training and retraining of its many severely disabled clients.

Economic, family, financial, medical, social, technology, transportation, personal preference, and other uncontrollable factors interact in complex ways to hinder reliable measurement of such outcomes. Fine (1957a) also noted extraneous factors beyond transferability of skills factors such as time and experience accrued in some occupations, educational level required for some occupations, and current needs of local employers. Fine also recognized that some workers acquire skills from schooling, home study, and leisure activities (including discretionary volunteer work).

The trauma of an injury alone may be enough to drive someone away from returning to a prior work activity. A person is often capable of finding a new job that might require use of abilities not previously demonstrated in prior work history. Sometimes financial necessity may drive a person to take a job that is inconsistent with prior work history. Others may intentionally seek a change from past work history in a quest to “do something different.”

In SkillTRAN’s opinion, assessment of occupations based on demonstrated transferable skills should be carefully distinguished from assessment of a wider range of occupations that “might be within a person’s abilities, irrespective of prior experience.” What is “currently transferable” and what “might be possible” are very different constructs/practical questions.

Perhaps the larger question is whether the SSA CFR criterion reference can be applied to other venues outside of the SSA arena. To the best of SkillTRAN’s knowledge, no other federal laws define transferability of skills. Absent other legal guidance, 20 CFR 404.1568d(1-3) provides a solid **construct** that should be equally useful in other venues. Because of the weight of the CFR as legal guidance, SkillTRAN and most of its competitors built software using this classic model foundation.

For additional documentation of the TSA process, reference, and responses to questions regarding reliability, validity, and other statistical issues, SkillTRAN has prepared and maintains a special bibliography of diverse reference material relating to the analysis of transferable skills. The most current version of this list is available at:

<http://online.skilltran.com/support/TSARefereceList.htm>

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### **IV. Error Rates for Wage and Employment Numbers**

***SkillTRAN Data Sources.*** Because SkillTRAN exclusively uses government data sources for wage and employment numbers, validity of such data is established by the original government data sources. Current Population Survey (CPS) data reports its Standard Error of Measurement (SEM). Occupational Employment Survey (OES) data is reported with the Relative Standard of Error (RSE). The error rates reported by these agencies are identified in each SkillTRAN report as the citation of the Confidence Interval (i.e., the  $\pm$  value after each employment number or mean wage). SkillTRAN uses the same government data, but reformats the information so that it is more useful for specific counseling, planning, and forensic purposes.

Complete information about specific government data incorporated into various SkillTRAN software products can be obtained directly from these government sources. Each of these sources has detailed information about the technical development of their data set:

- *Occupational Outlook Handbook (OOH)* – <http://bls.gov/ooh/>
- *Current Population Survey (CPS)* – <http://bls.gov/cps/>
- *Occupational Employment Survey (OES)* – <http://bls.gov/oes/>
- *Long Term Employment Projections (EP)* - <http://bls.gov/emp/>

Except in specific occupational groups that have but one corresponding DOT occupation, the government collects labor market data at an aggregated group level (i.e., Census or OES statistical groups). The number of DOT occupations in these statistical groups range from 1 to more than 1,500 DOT occupations in a single OES occupational group. These statistics are gathered annually by government agencies in a wide range of industries. The number of persons reported/estimated to be employed in any specific occupational OES group is reported by industry segments at the national level. Industry segments (defined by the North American Industry Classification System, NAICS) cover nearly all facets of the economy. The resulting matrix shows how many people were estimated by employers to be employed by NAICS industry. Some industries have more people employed in a particular occupation than other industries. Some industries hire none of a particular occupation; other industries hire many of them. What emerges is a national staffing pattern that can be viewed by occupation or by industry.

In addition to the Census and OES group estimates of occupational employment by industry, the DOL also prepares long term estimates of OES occupational employment for the next 10 years. These estimates are updated every other year and reflect projected occupational change industry by industry. These projections help in career counseling and workforce development.

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In 2008, SkillTRAN introduced a unique method for refining the estimation of group level government occupational employment data down to the level of the DOT occupation. The process uses existing, regularly updated government data, but narrows its focus to the industries that are the most likely employers for a specific DOT occupation. DOT occupational definitions are often so narrowly defined that they could only exist in but a handful of very specific industries. The DOT's own system of industry classification is poorly done and uses an odd mix of industries and cross-industry occupational categories.

The DOT industry classification assigned to a DOT occupation reflects only the industry in which the occupation was studied. The DOL knew that the DOT occupation cited might exist in other industries (DOL, page xix, 1977; DOL, page xxi, 1991a). To be able to best show where each occupation is likely to exist (i.e., which specific NAICS industries), SkillTRAN built its estimation method from a rational review each of the 12,761 DOT descriptions over the course of many years. This review was from a job placement perspective and assigned appropriate NAICS industries for each DOT occupation. Review of each occupation included study of the associated statistics available at the larger OES occupational group level.

### **V. SkillTRAN Estimation Method**

From the rational review described above, SkillTRAN was able to assign NAICS industries for each DOT occupation. DOL did not prepare this information except, however, for 151 OES groups which have but one DOT occupation. This linkage between DOT occupations and appropriate industries is the only proprietary portion of SkillTRAN's estimation methodology, as the rest of the data is pulled directly from current government statistics.

The SkillTRAN employment estimation process was built so that from the hundreds of industries often associated with an OES occupational group, SkillTRAN retrieves only the most relevant of these industries for the context of a specific DOT occupation. From there, SkillTRAN considers whether other DOT occupations in that same OES occupational group may be found, and proportionately weights the occupation to estimate how much employment in a specific industry might be attributable to a specific DOT occupation. This process is done on an industry by industry basis for each relevant industry. The calculations are performed by the software and an overall sum of the industry estimates is presented to the user. If the user disagrees with an industry suggested by SkillTRAN, the industry can be removed from the calculations. If the user believes (based on professional experience) that other industries may hire for a specific DOT occupation, the user can review the statistics for all of the related industries and add other industries to the list. The sum is recalculated whenever the industry staffing is altered. The software remembers those user choices so that the user has them for future inquiries.

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**Full-Time/Part-Time.** SkillTRAN shows the percentage of employment attributed to full-time versus part-time employment. The DOL defines full-time work as 35 hours or more per week (DOL, 2012). For some occupations, particularly in the retail, hospitality, and the services sectors, many occupations are part-time. This data is pulled from the Department of Commerce, Census Bureau as it collects the number of hours that people self-report working in the Current Population Survey (CPS). SkillTRAN allows users to apply these percentages to the estimates of DOT employment and shows the resulting mathematical impact of the estimates.

SkillTRAN acknowledges this method as one of estimation and refinement of existing government data. SkillTRAN encourages use of multiple methods of estimation, including labor market sampling, to help the professional shape the most defensible opinion.

### **VI. Peer Review**

In addition to the implicit concurrent validity study by SSA in 1987, various products now owned by SkillTRAN LLC have been independently reviewed by Botterbusch (1983, 1986). These software systems were again reviewed by an independent group in the book *Vocational Evaluation Systems and Software: A Consumer's Guide* (Brown, McDaniel, Couch, & McClanahan, 1994). Consumer ratings for the SkillTRAN software products (then known as CAPCO) showed the highest consumer ratings for Comprehensiveness and Overall Satisfaction (p. 137). The SSA uses licensed copies of the Job Browser *Pro*, OccuBrowse, and OASYS software available from SkillTRAN in its electronic digital library. The software is recognized by SSA as an acceptable electronic version of the DOT and as “useful electronic reference tools.” (SSA, 2009)

As discussed above, SkillTRAN utilizes a unique method for refining the estimation of government employment data down to the level of the DOT occupation itself. Since its introduction, this process has become widely used by both Vocational Experts and Claimant Representatives in appeal hearings for SSA disability benefits eligibility. This estimation process is also finding favor in vocational rehabilitation planning efforts for injured workers in the workers' compensation industry. Havranek, initially skeptical in his 2008 published review of the software, later saw that the process closely emulated his expertly derived method (Havranek, 2008). Ruck (2014) wrote a brief book explaining her experiences using this new method in the SSA venue, first as a vocational expert and now as a non-attorney claimant representative.

SkillTRAN's approach to estimating employment numbers at the DOT level has also been carefully reviewed by several attorneys, including Rohlfing (2013) and Lemoine (2012). Attorney Lemoine's review (<http://www.lemoinelawfirm.com/2012/09/10/crisis-confidence-inadequacies-vocational-evidence-presented-social-security-disability-hearings/>) goes so far as to suggest that the estimation process developed by SkillTRAN may well withstand a *Daubert* evaluation. Such a suggestion supports the notion that the estimation process falls within reasonable probability and constitutes substantial evidence.

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Another important issue is the concept of “peer review”. Traditional peer review includes critical written analysis presented in formal professional journals. Lemoine’s comments about SkillTRAN/Job Browser *Pro* are a good example, as his article was published in three parts in the newsletter of the National Organization of Social Security Claimant Representatives (NOSSCR). [NOTE: NOSSCR endorses no products.]

SkillTRAN recognizes the importance of peer review and adds another essential dimension to the concept: the day-to-day use of its products by customers in many venues, including litigated and non-litigated environments such as rehabilitation, SSA, Workers Compensation, and civil proceedings. Moreover, SkillTRAN encourages vocational and forensic experts to modify the industries suggested by SkillTRAN based on their professional experience. Rather than deliver a static process, SkillTRAN embraces the dynamic expertise of its customers and enables them to easily contribute their practical and current knowledge of industry trends.

While some may question the ability of the user to make changes since these changes impact the total estimate of job numbers, SkillTRAN believes this feature is one of its core strengths. SkillTRAN will analyze the user-suggested DOT to NAICS industry changes and modify its “master” cross-reference file based on appropriate customer feedback. This revised master cross-reference file will then be periodically released back to customers to reflect not only the industries suggested by SkillTRAN, but those suggested by its overall customer base throughout the US and its territories. In today’s culture of social media and rapidly changing data, what better, stronger and more dynamic review can there be than continuous customer review?

### **VII. Variation Among Occupational Search Methods**

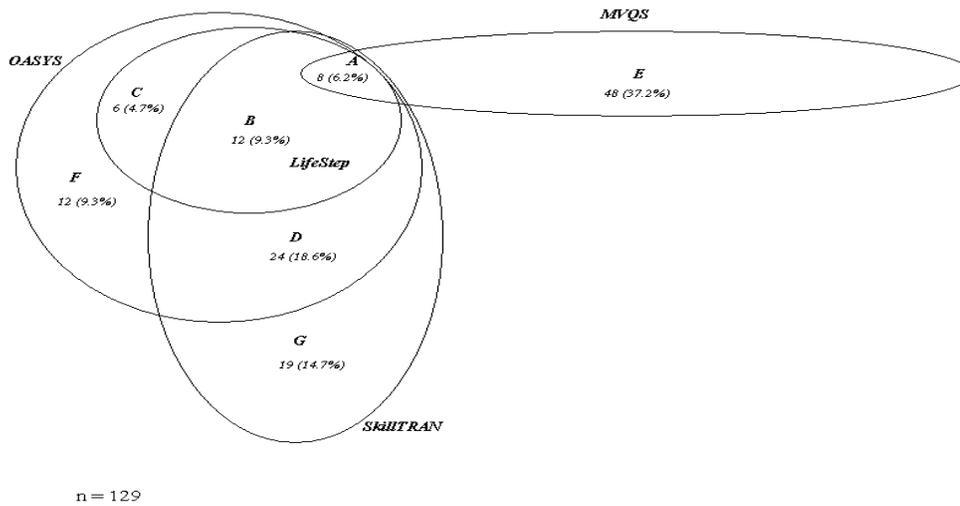
SkillTRAN understands that its reports are being used in a variety of forensic venues. SkillTRAN is highly transparent and carefully discloses its processes for transferable skills and employment estimates in each report. Various SkillTRAN products are programmed to search for occupations by Work Field, MPSMS, industry, Occupational Group Arrangement (OGA), *Guide for Occupational Exploration* [GOE] (DOL, 1979), Census groups, and SOC/OES/O\*NET Groups. Each search method will produce a different mix of occupations, some of which may be useful in some way, others of which will not be as appropriate. Sometimes there is very little overlap in lists, depending on the search methods chosen.

When the goal is to search to identify other occupations which are transferable (i.e., require minimal adjustment by the worker to the same or similar set of work expectations), then SkillTRAN recommends following the CFR definition for TSA based on Work Fields, SVP, and MPSMS codes. This is a method shown to closely emulate the adjudication process defined by the CFR for use at SSA.

When the goal is to find alternate occupations that a person “may be able” to perform, then additional methods are available to search for occupations using other classification systems beyond Work Field, SVP, and MPSMS (the Classic Model of TSA).

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Table IV. Venn Diagram Comparing Results of Four Transferable Skill Analysis Applications



The diagram above by Dunn, Williams, and Bast (2005) depicts the dramatic result of different search strategies used by four different software manufacturers (LifeStep, OASYS, SkillTRAN, and McCroskey) in one hypothetical case. This case was presented for comparative purposes at the 2003 IARP Forensic conference. The three classic TSA software approaches (LifeStep, OASYS, and SkillTRAN) used Work Field – SVP – MPSMS. The results clustered together closely. All 26 of the occupations found by LifeStep were also found by OASYS. OASYS found a total of 62 occupations and SkillTRAN found a total of 63 occupations. A total of 70% (n=43) of the OASYS and SkillTRAN occupations were identical, showing high concurrent validity. In striking contrast to the results of LifeStep, OASYS, and SkillTRAN is the group of McCroskey's 56 occupations. Only eight occupations were found in common with the classic TSA systems, and of these, four were semi-skilled (SVP = 3) and the other four were unskilled (SVP = 2). In other words, the diagram demonstrates that a different search method can produce a large variance among the occupations selected.

Code systems used for occupational classification are built for specific purposes. Searches conducted using a specific code system produce a unique set of occupations that are related to the intent of that code system (Truthan, 1989). However, depending on the code system, the results of a search may have little bearing on the question of transferability.

The SSA seeks to identify other occupations a person could likely perform immediately, that exist in significant numbers and without requiring significant amounts of training or retraining. For this purpose, the CFR definition is clear in its intent ... to identify occupational options that require but a minimal amount of time to learn and to adjust to the new occupations with little or no retraining. This is a different perspective from a search of other code systems that explore what other occupations "might be possible" based on similarity of occupational groups, interests, aptitudes, data-people-things relationships, career paths and/or training opportunities.

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Table 15.1 *Suggested Search Strategies by Venue*

Setting	Function	Search Codes
Social Security	Claims Adjudication	DOT, TSA*
	Ticket to Work	Interests, CIP, OGA Industry
Long-Term Disability	Claims Management	DOT and TSA*
	Retraining	Interests, CIP
Workers' Compensation	Return to Work	Industry, DOT, TSA*
State VR	Assessment, Planning, Placement	O*NET, CIP, TSA* Interests
Veterans rehabilitation	Assessment, Planning, Placement	MOC, O*NET, CIP, Interests
Corrections	Assessment, Planning, Placement	Interests, O*NET, DOT
Workforce development	Job Matching	O*NET
Welfare – Workfare	Assessment/Training	Interests, TSA*, CIP, O*NET
Schools – special education	Assessment/Planning	Interests, O*NET
Career transition	Assessment	Interests, O*NET, DOT
<b>Personal Injury Cases</b>		
Injury to children	Evaluating Potential	DOT/(O*NET)
Workers' compensation	RTW/Employability	DOT/O*NET
Catastrophic injury	RTW/Employability/LOEC	DOT/O*NET
Wrongful death	Future Lost Earnings	LMI–O*NET
Spousal support	Employment Potential	DOT/O*NET/LMI
TSA*=WF+SVP+MPSMS		

Truthan & Field authored a book chapter (Chapter 15 in Strauser, 2014) about *Computer-Based Vocational Guidance Systems and Job Matching* as used in various vocational rehabilitation settings. The table above (p. 252) presents a variety of search codes/systems that may be helpful in various venues. To assist triers of fact, vocational experts need to be very clear in explaining how the search methodologies used meet the specific needs commonly associated with specific venues. Certain venues have greater latitude for the introduction of potential occupations, with the condition that additional training, adjustment time, and/or other resources may be required. The SSA venue, on the other hand, is very narrow in its requirements as it does not take into account these other factors.

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### **VIII. Daubert Criteria**

The trier of fact is the “gatekeeper” to assure that scientific-expert testimony truly proceeds from “scientific knowledge.” Testimony by an expert must be relevant and reliable. Scientific knowledge must be the product of sound scientific methodology and derived from scientific method. Scientific method includes:

1. Empirical testing – Is the theory or technique falsifiable, refutable, or testable?
2. Subjected to peer review and publication
3. Have a known or potential rate of error
4. Have maintained standards and controls
5. Be generally accepted by a relevant scientific community

### **IX. Bottom Line**

The bottom line boils down to this: There are two very different methods for approaching the issue of transferable skills analysis. The classic method is rooted in the CFR definition which binds the SSA in its adjudication. The McCroskey occupational search method is very different from the classic method, in that it does not use Work Fields, SVP and MPSMS codes as its primary search engine. Both methods may have value depending on the matters and questions under consideration.

Any vocational expert or trier of fact must decide whether a clearly defined and easy-to-understand process built on standard Department of Labor data and the CFR and which demonstrably emulates SSA’s internal adjudication processes in thousands of test cases has relevance for a particular matter at hand in a specific program, jurisdiction, or application.

That same expert/trier of fact may also need to compare this legally defined method to an alternate proprietary method (such as the McCroskey method or some other search process) that is based on a truly proprietary statistical model with extensive modification of the standard DOT data set to improve the performance of the model, which may not necessarily reflect the observed occupational reality of the standard DOT.

Different search strategies present varied perspectives on what is or what may be possible. The vocational expert must interpret the results of any automated computer system, carefully evaluate the occupations suggested, and thoughtfully discern and defend any suggestion, particularly as supported by additional evidence including labor market information (wages, employment numbers, long term outlook, and local employment opportunities). There may also be other factors not captured in standardized classifications of occupations that weigh heavily in a particular situation.

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