Job Analysis Manual

Civil Service Selection

DEPARTMENT OF ADMINISTRATIVE SERVICES
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SECTION I – Introduction

What is job analysis?

Job analysis is a detailed examination where one collects, reviews, and analyzes important work – related aspects of a job. It is the process one goes through to break down the work activities, the tools and equipment needed to perform a job, the context of the work environment, and the requirements to perform the job successfully (such as knowledge, skills, abilities, education, experience, or personal characteristics).

Why do we conduct job analysis?

Usually, we conduct a job analysis so that we can understand what work related behaviors should be measured, and what criteria should be used in our hiring practices. However, job analysis gives us much more information and can be used for other reasons as well. We can use the information, for instance, to create and validate selection instruments (such as written tests, structured interviews, assessment centers), establish performance evaluation criteria, write position descriptions, and evaluate compensation and recruitment techniques. These are only a few examples of how we use job analysis. Just about every aspect of the human resources field can be linked to a job analysis in some way. So it is important for every human resources professional to understand job analysis.

Which job analysis method should be used?

There are several job analysis methods that are acceptable for collecting job information. Some of the traditional strategies include, job analysis questionnaires/checklists, critical incidents, observation, work participation, and interviews (both group and individual). The focus of this training manual is going to be on the interview method, where the job analyst meets with subject matter experts and asks pertinent questions about the job under analysis. We will discuss two job analysis methods: a short version and a long version (based on WRIPAC). Either version is acceptable for creating and validating selection instruments; but if you need to establish position specific minimum qualifications (PSMQs), the long version (based on WRIPAC) will be required unless you get permission from DAS – Office of Classification and Compensation to use another methodology.

What are the relevant laws and court cases surrounding job analysis?

Uniform Guidelines on Employee Selection Procedures of 1978

The Uniform Guidelines on Employee Selection Procedures were written to provide employers with guidelines to ensure they complied with Title VII, which prohibits discrimination on the basis of sex, race, color, religion, or national origin in all aspects of employment. Prior to its enactment, the four federal agencies, the Civil Service Commission, the Department of Labor, the Department of Justice, and the Equal Employment Opportunity Commission all had separate interpretations of Title VII, which caused confusion for employers. So the four federal agencies collaborated and agreed that the Uniform Guidelines would define, address and set the standards for validity issues, adverse impact issues, and record keeping requirements. They provide the framework for determining the proper use of selection procedures, and apply to all testing and employment decisions. There are several basic

principles of the Uniformed Guidelines which are important to keep in mind. To see a full copy of the Uniformed Guidelines, please go to www.uniformguidelines.com.

1) It is against the law to use a selection procedure that has adverse impact unless it is justified. The only way to justify the use of a selection tool that has adverse impact is to conduct a thorough job analysis, and show that there is not another instrument without adverse impact that can be used in its place.
2) You must maintain data or information that discloses the impact that tests and other selection procedures have on the protected classes.
3) The courts will not accept any assumptions of validity. Validation studies must be conducted to show that a test or selection procedure is job related. Evidence of content validity for selection instruments or procedures is acceptable provided that one can prove that candidates are being evaluated on a representative sample of all the important aspects the job.
4) Content validation studies must be based on a job analysis. The job analysis should elicit the important work behaviors, tasks, and knowledge, skills and abilities that are required for successful performance. If the work behaviors are not observable, then the analysis should focus on the work products. The knowledge, skills, and abilities (KSAs) should be operationally defined in terms of observable behavior that is required to perform a job successfully. Tests or selection devices should be based on the KSAs that are a prerequisite to performing the most important aspects of the job, and should be a representative sample. Further, the test or selection procedures should resemble the observable work behavior as much as possible.
5) The job analysis should be appropriately documented.

Americans with Disabilities Act (ADA)

The ADA was enacted to prevent individuals with disabilities or perceived disabilities (mental or physical) from being discriminated against in the workplace. It requires that employers identify the essential job functions so that they can evaluate the qualifications of an individual without making discriminatory assumptions, and in essence, provide equal employment opportunities. This could include providing a reasonable accommodation to applicants/employees for both the selection process and actual performance of the essential job functions of the job. Essential job functions are defined by the ADA as the "tasks that are fundamental, not marginal or unnecessary, to fulfillment of the position objectives." Reasons for considering a function to be essential include, but are not limited to:

1) The job exists to perform that function.
2) The function is specialized and requires that the individual selected have the expertise or ability to perform that function.
3) The function can not be distributed to other employees due to the availability of employees who are able to perform that function.

In addition, the ADA requires that employers use test or other selection instruments that do not screen out individuals with disabilities unless it can be shown that it is job related and is a business necessity. It also requires that employers select and administer a test that is most effective in ensuring that individuals with disabilities are accurately reflected.

Griggs v. Duke Power (1971)

In this court case, Duke Power required its staff to either have a high school diploma or pass an intelligence test if they wanted to be promoted. At the time, most Black employees worked in divisions where they were paid less than the lowest paying jobs in the divisions primarily staffed with White employees. Griggs and others claimed that having a diploma and/or passing an intelligence test was not necessary to successfully perform the job. He showed that Duke Power had selected White employees to the higher paying positions even though they didn't meet the new requirements and these individuals were able to adequately perform their jobs. Because of this, Griggs claimed that his Civil Rights had been violated. Duke Power could not prove that the instruments/requirements they used were related to the job(s) in question. The U.S. Supreme Court ruled in favor of Griggs, and found that the requirements excluded Blacks and had disparate impact on a protected class without evidence of the job relatedness of the requirements. Therefore, their hiring practice was prohibited despite the fact that the employer lacked discriminatory intent.

Albemarle Paper Company v. Moody (1975)

In this case, a group of African-American employees complained that the Albemarle Paper Company used tests in their selection processes to keep African-American employees in lower paying positions. Like the Griggs versus Duke Power case, the company required employees in skilled labor positions to hold a high school diploma. They also had to pass two additional tests. The U.S. Supreme Court clarified that for a test to be considered job related it must be able to hold up to the standards defined by the EEOC Guidelines and the American Psychological Association. The court then compared Albemarle Paper Company's validation study to the test validation standards from the EEOC, and found that there were several items that were either inappropriate or missing. Consequently, they ruled that Albemarle Paper Company had not proven the job relatedness of their testing program. They further stated that if the company were able to prove the job relatedness of their tests, the complaining party would bear the burden of proving that other selection tests or devises that do not have adverse impact, "would also serve the employer's legitimate interest in 'efficient and trustworthy workmanship'." If the complaining party were successful in proving this, they would have evidence that the employer used the test to discriminate.

What are SMEs?

SME stands for subject matter experts. These are the individuals inside and outside of your agency that are knowledgeable about the job under analysis. SMEs include job incumbents, the supervisor of the position, other employees in the classification, consultants, etc. Selecting who will serve as your subject matter experts is probably the most important decision you as the job analyst will have to make. Who you select will determine the quality of the information that is gained from the job analysis. These individuals are setting the standards for the people you hire, so you want to make sure that you have selected individuals who really understand the job, and who are your best performers. Before getting started on either analysis, identify the subject matter experts and begin documentation log. Again, you should choose individuals who are most knowledgeable of the job and who are your best performers.

What are duties versus tasks?

Duties are broad statements that describe the general functions of a job. They identify and precede a group of related tasks. Whereas tasks are detailed statements that support and describe how a duty is carried out. Task statements fit together to form an identifiable job function, or duty.

What are KSAOs?

KSAO is an acronym that stands for knowledge, skills, abilities, and other characteristics (such as competencies, personality and training) that are necessary to be successful on the job. Many individuals have difficulty with understanding the difference between KSAs. Knowledge is the possession of a body of information that relates to the performance of a job function. Skill is the physical demonstration of a learned, observable psychomotor behavior, and ability is the mental or physical capacity to perform an observable behavior.

SECTION II - Job Analysis Steps for Long Version*

*Based on Western Region Intergovernmental Personnel Assessment Council WRIPAC methodologies

Introduction

The WRIPAC job analysis process that is recommended by the State of Ohio can be very tedious. These instructions are meant to provide agencies with options to make the process less time consuming and more attractive for agencies and their hiring managers, while keeping the integrity of the process intact. This manual combines some of the WRIPAC job analysis steps so that managers and agency personnel can get through the process more quickly. In addition to using the information provided here, it is also recommended that individuals use a laptop and projector in their job analysis meetings in effort to further reduce the time it takes to get through the process from beginning to end. It also helps if you as the job analyst are as familiar with the job as possible. This will enable you to generate the appropriate questions and understand some of the terminology and jargon prior to the meeting. Some of the things you can do to prepare for a job analysis are: review the classification specification for the position for which you are analyzing, review the old position descriptions on file to see if there are duties that can be salvaged or revised, use the Internet to find positions that are posted at other agencies or the private sector that may have similar duties to the position you are analyzing, or you could meet with the hiring manager prior to your subject matter expert meetings to see if they can give you an overview of the duties for the position.

Step 1 – Develop, Edit, and Rate List of Task Statements

The first step to any job analysis is to identify the SMEs and start your documentation log. Once you've accomplished this, you can begin to generate and validate the necessary tasks and/or duties that are required to fulfill the job. This can be performed in any number of ways. Some of the most common methods of collecting information are: interviews with subject matter experts, use of a job analysis questionnaire (such as the Position Description Questionnaire or PDQ), and observation. There are advantages and disadvantages to each type of information gathering technique. You will need to be able to weigh these advantages and disadvantages to see which method best fits the needs of the agency. Often times, you may find that it is better or more effective to use a combination of methods to gather information. For instance, you may find that you would like to have the hiring manager complete a job analysis questionnaire in addition to holding a group meeting with subject matter experts; or you may want to directly observe employee's behaviors and conduct individual interviews. Whichever way best fits the position you are reviewing and the needs of your agency is fine, you just need to ensure that you document your processes accordingly.

This manual will primarily focus on the interviewing technique because it is the one that is most difficult for the job analyst. Whenever you conduct an interview, whether it is an individual or group discussion, you should keep a few guidelines in mind (McCormick, 1979).

1. Be sure to prepare for the interview (See introduction of this section).
2. Start the interview by building rapport with your subject matter experts, and putting them at ease. Most employees have not gone through a job analysis, and a simple explanation as to the purpose of the meeting and the role they should play will allow them to relax and mentally prepare for the meeting.
3. Make sure that you ask open ended questions to generate discussion. Also allow the subject matter experts plenty of time to elaborate on the issues they feel are important.

To begin the process of task development, you may find it easier to ask general questions first, and get more specific as you move through the process. For example, you may want to begin your job analysis meetings by asking one or more of the following questions:

1. Describe a typical day for an individual in this position.
2. What are the major functions or activities of this job?
3. What is the purpose of this job?
4. Describe your job in terms of what you do.

As you begin to generate discussion among your SME's, you will need to ensure that you generate task statements that reflect the following:

1. What action is performed? Use a verb to reflect the action in the statement.
2. To whom or do what? Be sure to state the object or verb.
3. What is the expected output or outcome of the action? What is produced?
4. What tools, equipment, or materials are used?
5. How much time does it take to perform the major tasks? How often are those tasks performed?
6. How much direction will the successful candidate receive to perform the job? What instructions will they have?

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Once the task statements have been created, you then have the subject matter experts rate each of them on the criticality of the task, and the relative time spent performing the tasks. When rating for the criticality, SMEs should understand that they are also determining if the task is an essential function of the job. This is important because the Americans with Disabilities Act (ADA) restricts agencies and organizations from creating selection plans that do not directly link to the essential functions of the job. The ADA ensures that individuals with disabilities are not discriminated against. Therefore, to ensure that you are in compliance, you want to make sure that your SMEs pay attention to this part of the criticality rating. You may print the rating sheets and scales off the enclosed CD, or you may print the rating scales from this manual. SMEs should use the two scales on the following page to rate each task statement. Enter the task ratings into the enclosed software. The software will calculate the mean "Criticality" ratings, the mean "Importance of Task" ratings, and the "Importance of Task" Index automatically. Please see Appendix A for actual formulas.

TIMESAVER

If you have a laptop and projector set up in the meeting room, you can type the task statements as you go along. You can also ask the SMEs to verify the information on the screen so you can be sure that you interpreted their discussions correctly. Any changes to the task statements can be made as you go. Ask the SMEs for their ratings, and enter them into the software during this meeting. The software provided will automatically compute the task ratings. The actual calculations for the computation are in Appendix A. Make sure that you have the rating scales available prior to this meeting.

USING THE DATA

The first thing you want look at is the mean "Relative Time Spent" and the mean "Criticality" ratings for each task. Any mean ratings that are less than 0.5 should be eliminated. Next you want to eliminate any task that has an "Importance of Task" rating of less than 2.0. Please be advised that these cut-off scores are recommendations, and can be modified to meet the needs of your agency, provided that you can provide a justification in your documentation. The remaining tasks are those that are deemed as important to the SMEs, and can be used to create the official position description for the job and for test development.

Criticality of the Task

Scale Value	Definition
0	This task is NOT PERFORMED on the job or is TRIVIAL to acceptable performance on the job. -OR- This task is a non-essential function of the job.
1	Satisfactory performance of this task is IMPORTANT to acceptable performance on the job, -AND- this task is an essential function.
2	Satisfactory performance of this task is CRUCIAL to overall acceptable performance on the job, -AND- this task is an essential function of the job.

Frequency of the Task

Scale Value	Definition
0	This task is NOT performed.
1	This task is RARELY performed.
2	This task is OCCASIONALLY performed.
3	This task is FREQUENTLY performed.

Step 2 – Develop, Edit, and Rate the Knowledge, Skills, Abilities, and Others

The second step to the job analysis process is to identify the knowledge, skills, abilities, and other characteristics (i.e., KSAOs) that are required to adequately perform the job. However, before you can develop KSAOs, you have to understand the definitions. The Uniform Guidelines of 1978 provide us with some standard definitions.

Knowledge – "A body of information applied directly to the performance of a function." In other words, knowledge is the learned information that is needed prior to being able to perform an observable behavior. An individual can always acquire more knowledge.

Skill – "A present, observable competence to perform a learned psychomotor act." So, a skill is the observable work behaviors of the job.

Ability – "A present competence to perform an observable behavior or a behavior which results in an observable product." Ability is something that can not be obtained after employment. It is the foundation of both knowledge and skill. Abilities can be very difficult to measure.

Other – Other characteristics that are relevant to the performance of the job that are not KSAs (e.g., competencies, certifications or licenses that are required by the law).

As you begin to generate discussion among your SME's, you will need to ensure that you generate KSAO statements that reflect the following:

1. The KSAO statements should be operationally defined. For example, it's not enough to state that someone should have the "ability to communicate verbally and in writing." It's better to define the type of communication needed for your operational needs. Instead, you may decide to re-write the statement to say: "Ability to communicate effectively both orally and in writing with both technical and non-technical people." Notice that the second statement includes enough information that it tells you what KSAO the individual needs to have (ability to communicate), the degree of accuracy or level (needs to communicate effectively), and the effect or context of the skill (for both technical and non-technical people).
2. KSAO statements should not be a restatement of the task statements. For example, if your task statement is "Provides training and technical assistance on human resources processes and procedures," you do not want to simply put the words knowledge, skill, or ability in front of that statement. Instead, you want to think of exactly what is needed to perform that function. It would be more appropriate to say, "Skill in speaking one-on-one or in front of a group in order to provide information or explain processes or procedures." You may also want to include: "Knowledge of employment law (e.g., ADA, FMLA)."
3. Do not put more than one KSAO in one statement. This will cause your SMEs to be confused when they rate the item. It also may alter their ratings. For example, instead of stating: "Ability to read and write," it's better to have two statements, one that reflects more specific information each of those abilities. Better statements would be "Ability to

read and understand written instructions," and "Ability to write clear and accurate reports."

4. The only way to truly validate the requirement of a certification or license to perform the job is if it is required by law. For example, RNs and LPNs are required to have a license to practice nursing. An effective way of writing a statement for this is: "Must have and maintain a valid license to practice nursing."

Once the KSAO statements have been created, you then have the SMEs rate each of the task statements on its criticality to the job, and whether that KSAO is needed when a new person walks into the door. KSAOs that can be obtained during the probation period or after training should be reflected in the ratings. Again, you may print the rating sheets and scales off the enclosed CD, or you may print the rating scales from this manual. SMEs should use the two scales on the following page to rate each task statement. Enter the data into the enclosed software, and the mean ratings and Importance of KSA ratings will automatically calculate. Please see Appendix A for the actual formulas.

TIMESAVER

If you have a laptop and projector set up in the meeting room, you can type the KSAO statements as you go along. You can also ask the SMEs to verify the information on the screen so you can be sure that you interpreted their discussions correctly. Any changes to the KSAO statements can be made as you go. Ask the SMEs for their ratings, and enter them into the software during this meeting. Make sure that you have the rating scales available prior to this meeting.

USING THE DATA

The first thing you want look at is the mean "Expected at Entry" and the mean "Criticality" ratings for each task. Any mean ratings that are less than 1.5 should be eliminated. Next you want to eliminate any KSAO that has an "Importance of KSA" rating of less than 3.0. Please be advised that these cut-off scores are recommendations, and can be modified to meet the needs of your agency, provided that you can provide a justification in your documentation. The remaining KSAOs are those that are deemed as important to the SMEs, and can be used in the official position description for the job.

Expected at Entry

Scale Value	Definition
0	Possession of NONE or a TRIVIAL amount of the knowledge, skill, ability, or other characteristic is expected upon entry to the job.
1	Possession of SOME of the knowledge, skill, ability, or other characteristic is expected upon entry to the job.
2	Possession of MOST of the knowledge, skill, ability, or other characteristic is expected upon entry to the job.
3	Possession of ALL of the knowledge, skill, ability, or other characteristic is expected upon entry to the job.

Criticality of the KSAO

Scale Value	Definition
0	Possession of the knowledge, skill, ability or other characteristic is NOT RELATED to overall satisfactory job performance.
1	Possession of the knowledge, skill, ability or other characteristic is HELPFUL or DESIRABLE for overall satisfactory job performance.
2	Possession of the knowledge, skill, ability or other characteristic is IMPORTANT to overall satisfactory job performance.
3	Possession of the knowledge, skill, ability or other characteristic is ESSENTIAL to overall satisfactory job performance.

Step 3 – Rate the Necessity of KSAOs for Task Performance

The third step in the job analysis process is to link the remaining KSAOs to the remaining tasks. This step will help you develop valid selection instruments, and provides the required information to obtain position specific minimum qualifications (PSMQs). KSAOs that can not be linked to any task should be eliminated from your job analysis, and should not be included in your selection plan. SMEs should use the scales on the following page to rate each KSAO/task linkage. Enter the ratings into the software, and the "Necessity for Performance" ratings (i.e., NP ratings) and "Weighted Linkage" ratings will automatically be calculated. Please see the Appendix A for the formulas.

TIMESAVER

Instead of asking your SMEs link the KSAOs to each task, have them link them to the duties instead. This will eliminate a good number of ratings the SMEs will have to do. The enclosed software will allow you to perform these ratings with either method you choose. You also may want to allow the SMEs to do these ratings on their own with a deadline for submission to you, or depending on the number of KSAOs in your analysis, you can also go around the room and enter the ratings as you go along (with laptop and projector).

USING THE DATA

The NP ratings and weighted linkages should be used when developing the selection plan. Any KSAO that does not have NP values higher than 1.5 should not be part of your selection plan as these are the KSAOs that are desirable, not necessary for successful performance of the job. Details on how to use the weighted linkages to develop your selection plan will be discussed in the next step of the job analysis process.

Necessity for Performance

Scale Value	Definition
0	Possession of this KSAO is NOT RELATED to satisfactory overall performance of this task.
1	Possession of this KSAO is DESIRABLE, but not essential, to satisfactory overall performance of this task.
2	Possession of this KSAO is IMPORTANT to the satisfactory overall performance of this task.
3	Possession of this KSAO is ESSENTIAL to the satisfactory overall performance of this task.

Step 4 – Developing the Selection Plan and Weights

The fourth step in the job analysis process is to create a selection plan. An important thing to remember is that you do not have to test for every KSAO that the SMEs rated. You can focus your assessments on only the most important KSAOs. So how do you narrow down your KSAO pool? This is where your weighted linkages come into play. You should have a weighted linkage score for each KSAO linkage to task or duty statement. To get the total weighted linkage, you will need to add all of the weighted linkage scores for each individual KSAO. Once the weighted linkages have been added, you can put the KSAOs in rank order to determine which ones should be part of your selection plan. Questions you should ask yourself when narrowing down your selection plan are as follows:

1. Is there a point where there is a significant gap in the total weighted linkage points? This typically indicates that KSAOs lower in the hierarchy have less value than the KSAOs higher in the hierarchy.
2. Is there a point where having knowledge, skill, or ability in one area presumes that an individual has knowledge, skill, or ability in another?
3. Is there some point where KSAOs are part of the minimum qualifications or position specific minimum qualifications?
4. Is there a point in the hierarchy where lower ranking KSAOs can be learned during the probation period?

If you answer "yes" to any of these four questions, you can justify your cut-off at the point identified. Don't forget to document your reasons!

Example:

Below is an example of three duties with the corresponding KSAOs and weighted linkages.

Duty 1	Weighted Linkage
K 1 – Knowledge of Inventory Control	15.00
K2 – Knowledge of Customer Service Techniques	45.87
K3 – Knowledge of Lead Work	44.58
S1 – Skill in using Microsoft Word	63.47
A1 – Ability to properly handle escalated customer calls	42.91
A2 – Ability to cooperate with co-workers on projects	26.39
Duty 2	
K2 – Knowledge of Customer Service Techniques	57.51
K3 – Knowledge of Lead Work	38.64
S1 – Skill in using Microsoft Word	25.54
A1 – Ability to properly handle escalated customer calls	50.30
A2 – Ability to cooperate with co-workers on projects	10.00
Duty 3	
K2 – Knowledge of Customer Service Techniques	44.00
K3 – Knowledge of Lead Work	36.04
A1 – Ability to properly handle escalated customer calls	39.24

Add weighted linkage scores for each KSA

	K1	K2	K3	S1	A1	A2
	15.00	45.87	44.58	63.47	42.91	26.39
		57.51	38.64	25.54	50.30	10.00
		44.00	36.04		39.24	
Totals	15.00	147.38	119.26	89.01	132.45	36.39

Use the weighted linkage totals to put KSAOs in order from highest to lowest

KSA Hierarchy	Weighted Linkage Totals
K2 – Knowledge of Customer Service Techniques	147.38
A1 – Ability to properly handle escalated customer calls	132.45
K3 – Knowledge of Lead Work	119.26
S1 – Skill in using Microsoft Word	63.47
A2 – Ability to cooperate with co-workers on projects	36.39
K1 – Knowledge of Inventory Control	15.00

Based on this example, your selection plan you would only include the first three KSAs because of the significant gap between K3 and S1.

Now that you have determined the most important KSAOs, you must gather the SMEs again to establish your selection plan and determine if it is appropriate to rank the candidates based on the KSAOs that are part of the selection plan. You must figure out the best way to determine if an individual holds the necessary KSAOs for the position you are analyzing. There are many different methods of evaluating KSAOs. The most common among state government include the Civil Service Application, written assessments, structured interviews, training and experience ratings, and work samples/simulations. The job analyst, along with the help of the SMEs, has the flexibility to decide which selection instruments are best for gathering the required information. Two principles to keep in mind when deciding which selection instrument to use are: 1) The instrument must measure the KSAOs identified from the job analysis. The job analyst must be able to directly link each item on the selection instruments to a specific KSAO. 2) The selection instruments selected must be able to differentiate between the applicants. Every applicant should possess different amounts of the required KSAs. The selection instruments should be able to take these differences into account in the scoring process, where as applicants will be rank ordered.

In the example above, we must determine which selection instruments we will use to test the candidates' possession of the three KSAs. As the job analysts, we have determined that a written examination and a structured interview are the best ways to test for these three KSAs. Therefore, we will create test items for both the written examination and structured interview. This means that each selection instrument will need to be properly weighted, and each KSA will need to be appropriately weighted within each selection instrument. Let's first start with the selection instrument weights. Remember the weighted linkage totals? You will need these to calculate the selection instrument weights. You take the weighted linkage total for each KSAO, and distribute it among the selection instruments. For K2 and A1, we have decided to have two assessments: a written examination and structured interview. So we are going to distribute one half of the weighted linkage totals to each of the selection instruments. The final KSA, K3, will only be evaluated at the structured interview; therefore, the entire weighted linkage total will go to the structured interview (See Table 1). To calculate the selection instrument weights, you will add the total weighted linkages across all selection instruments. Next you divide the total weighted linkage for the selection instrument by the total weighted linkage for all selection instruments. To change the number to a percent, you simply multiply by 100. The formula is: Total weighted linkage for selection instrument/total weighted linkage for all selection instruments * 100 = Selection Instrument Weight. In the example below, you add 139.92 and 259.18 to get 399.10. To get the selection instrument weight for the written

examination, you divide 139.92 by 399.10 to get 0.351 or 35%. To get the selection instrument weight for the structured interview, you divide 259.18 by 399.10 to get 0.649 or 65%.

Table 1: Selection Plan and Selection Instrument Weights

KSAO	Written Examination	Structured Interview	Totals
K2	73.69	73.69	147.38
A1	66.23	66.23	132.46
K3		119.26	119.26
Total	139.92	259.18	399.10
Selection Instrument Weight	35%	65%	100%

Now that you have the selection plan, you should determine the appropriateness of using the KSAOs for ranking. This will allow you to establish that the selection procedures you are using are appropriate for ranking purposes. The SMEs should rank each KSA included in the selection plan based on the following scale:

Scale Value	Definition
1	Yes…Possession of increasing amounts of this KSA beyond the minimum required level is likely to differentiate between levels of job performance.
0	No…Possession of increasing amounts of this KSA beyond the minimum required level is NOT likely to differentiate between levels of job performance.

Next, you take the mean ranking for each KSA. Any rating that is greater than 0.50 is adequate evidence that the selection procedures assessing the KSAs are appropriate for ranking.

The final step in the job analysis process is to calculate the weight that each KSA should contribute to the selection instrument. This will assist you with establishing the number of points that should be distributed through out the selection instruments. The process for calculating this is very similar to what we did above. This time, you take the weighted linkage of the KSA and divide it by the total weighted linkage for the selection instrument. Keeping with the same example, you would take 73.69/139.92*100=53%. So K2 should account for 53% of the written examination. The remaining 47% of the written examination should link to A1. You do the same thing with the structured interview. You take 73.69/259.18*100=28%. So, K2 should account for 28% of the structured interview. Next you take 66.23/259.18*100=26%. So, A1 accounts for 26% of the structured interview. Finally, you take 119.26/259.18*100=46%. K3 should account for 46% of the structured interview. Once you've completed all of this, you should have all that you need to create a valid selection instrument. Make sure that you've maintained all of the documentation from your meetings and reports in one place in the event of a challenge.

SECTION III - Job Analysis Steps for Short Version

Step 1: Documentation Log

Begin to document the job analysis and test development processes. As previously mentioned, documentation is critical throughout the process.

ACTION ITEM!!! Turn to Appendix B and enter your name and the date you began job. This notation begins your test log, the documentation needed to demonstrate the job-relatedness of your test. Demonstrable job relatedness is a requirement of the *1978 Uniform Guidelines on Employee Selection*. Without it, you lose if challenged in federal court or by the union.

Step 2: Identify your SMEs.

You will recall that SMEs are subject-matter experts, those who are intimately familiar with the job in question.

If you have the luxury of using the job incumbent, use him or her. This is the person most familiar with what the job entails. Next, recruit the supervisor of the incumbent and any colleagues of the incumbent who are similarly classified. For highly technical positions, you might solicit the help of a college professor or someone in the private sector who works in a similar position.

Do your best to identify those who are in the best position to judge the accuracy of the PD or who, after reading a description of the job, can identify what knowledge, skills, and abilities (KSAs) are needed to successfully perform the job.

ACTION ITEM!!! Turn to Appendix B and write the names and titles of your SMEs in the space provided. Do not proceed without the input of at least three SMEs.

Step 3: Verify the accuracy of the Position Description (PD) for the job in question.

Gather the SMEs in one room, and give each of them a copy of the PD. Appoint a recorder to capture the discussion of these questions:

a) Are the duties and tasks accurately described?
   Jobs change over time. Procedures change; equipment is updated; methods are automated. New laws may dictate how much or how little discretion an employee may use in making decisions. A change in the economic climate may signal a change in emphasis or focus. A reduction in workforce or resources may have impacted the work the employee in this position does. Consider what circumstances may have caused the job to change and update the PD to reflect the change.

b) Has the importance or frequency of any duty changed?
   If you have identified a change from Step 3a above, you must also consider if the importance and/or the frequency of any duty has changed. For example, introducing automated systems into the workplace often decreases the percentage of time needed to perform a duty. Again, reflect these changes on the PD and proceed to Step 3c.

c) Are the worker characteristics representative of the knowledge, skills, and abilities (KSAs) needed to perform the tasks listed? Are some KSAs missing? Are some included that shouldn't be?

IMPORTANT: No matter what process your Human Resources Office uses to update the PD, you should make any changes to the PD now and use this draft to continue the job analysis and test development process. These processes are independent from updating the PD and should continue while your HR office follows the process to update the PD. When the PD is approved and returned from your HR office, add the approved copy to your test log and keep the draft PD as part of your record. Continue with job analysis, using the draft PD.

ACTION ITEM!!! Insert the draft position description and the notes from your discussion in your test log in Tab 3.

Step 4: Assign a value to each duty.

Turn to Appendix B for a methodusing a paired comparison. Or, with your SMEs, determine if the value of each duty is dictated by the order listed on the PD., e.g., if duties become less important, then one might assign the first of four duties a value of "4"; the second duty, a value of "3"; the third, a value of "2"; and the last a value of "1."

If, on the other hand, the order of the duties was determined by the percentage of time spent performing duties of equal importance, your value assignment for four duties might look more like this:

Duty 1—4
Duty 2—4
Duty 3—3
Duty 4—1

Position Description:

Duty 1: 4

Duty 2: 4

Duty 3: 3

Duty 4: 1

Whatever method you use, describe it in your test log or follow the paired comparison method included in Tab 4. A test log entry might look like this:

Dear Test Log,

Today we assigned values to duties using the paired comparison method.

SME #1

ACTION ITEM!!! Enter the value assigned for each duty on the chart in Appendix B. Also, record on this same chart the percentage of time spent for each duty by referring to the revised PD.

Step 5: Importance of Duty Scores.

Multiply the value of each duty by the percentage of time spent. This number is the Importance of Duty (ImpD) score.

ACTION ITEM!!! Complete the calculation from step 5 and enter that number in the chart on page of Appendix B.

Step 6: KSA Point Distribution

Determine a hierarchy of KSAs by distributing the points reflected by the Importance of Duty score among the KSAs linked to that duty. This distribution begins the process of determining the KSA hierarchy.

By considering how critical each KSA is to successfully performing the duty to which it is linked, the KSA will begin to take on a value and will accumulate value each time it is linked to a duty and assigned a piece of the ImpD point total.

For example, if the ImpD score for Duty 1 is 140 [frequency (35%) multiplied by the value of the duty (4) from Step 5] and there are seven KSAs linked to the duty, then the SME will determine how many of the 140 points should be assigned to each KSA. Theoretically, if the SME determined each KSA was of equal value in contributing to successful performance, he or she could assign 1/7 of the total points (20) to each KSA. *This is rarely the case.*

ImpD Ratings Points of 140	
KSA #1	50
KSA #2	50
KSA #3	10
KSA #4	30
KSA #5	00
KSA #6	00
KSA #7	00

More often, there are one or two KSAs that are far and above the others in their contribution to successful performance, and these should, therefore, receive the bulk of the points. Note: It is not necessary to "waste" valuable points on KSAs of lesser importance, e.g., skill in the operation of office machinery linked to a report writing duty requiring the more critical KSAs like these: the ability to write clearly and concisely, the ability to perform statistical analysis, the ability to establish facts and draw conclusions. In other words, SMEs may completely bypass a KSA when distributing the ImpD points. In addition, it is important for SMEs to focus on the KSAs that the applicant must bring to the job and not those KSAs that can be learned and/or enhanced after employment.

This process will continue for each Duty.

ACTION ITEM!!! Use the sample rating forms Appendix B and enter for each duty the KSAs and the KSA description (e.g., 5/Knowledge of Management). Insert the pointes determined by the ImpD calculation in the space provided.

Step 7: SME Ratings & KSA Tally

Distribute the rating forms to each SME for independent completion. Then collect and tally the value of each KSA. NOTE: If a KSA is linked to successive duties, it will accumulate value each time a portion of the ImpD points is assigned.

ACTION ITEM!!! Use the tally sheet in Appendix B to determine the overall value of the KSA. Enter the points assigned by each SME to the KSAs, add them up, and then divide by the number of raters. This number is the KSA's overall value or the Importance of the KSA (ImpK) score.

Step 8: KSA Hierarchy

List the KSAs in a hierarchy, starting with the most highly valued KSA. Arrange the remaining KSAs in descending order by ImpK score.

ACTION ITEM!!! Use the form in the Appendix to list your KSA hierarchy.

Step 9: Determine which of these KSAs will be assessed during your selection process. ***It is not necessary to test all KSAs.***

Gather your SMEs and record their rationale for determining at which point in the hierarchy KSAs are considered to be of diminishing value. Consider these questions:

1 Is there a point at which there is a significant gap in ImpK scores? The point in the hierarchy where the gap between ImpK scores starts to widen usually indicates that the KSAs lower in the hierarchy are beginning to have less value in their contribution to successful job performance. **<u>This is the "cut-off" point.</u>**

2 Is there a point at which one can assume that the lower-ranking KSAs are necessary components of higher ranking KSAs (e.g., it is probably safe to assume that if an applicant can perform algebra or

ImpK Scores	
KSA #1	162
KSA #2	155
KSA #3	142
KSA #4	141
KSA #5	77
KSA #6	50
KSA #7	12

statistics then he or she also has the ability to calculate fractions, decimals, and percentages).

3 Is there a point in the hierarchy where the lower-ranking KSAs are part of the minimum qualifications of the position? You might argue that if the applicant made it through application screening, then he or she has sufficiently described experience or education indicating possession of these KSAs.

4 Is there a point in the hierarchy where the lower-ranking KSAs could easily be acquired during the probationary period?

ACTION ITEM!!! Indicate on the form in Appendix B the rationale for testing only certain KSAs.

Step 10: Develop your test plan.

As a result of Step 9, you will have determined which KSAs will be assessed during your interview process. These KSAs, their ImpK scores, and a decision of how to best assess the KSAs will constitute your test plan.

Choose the method of testing which will give you the best indication of the applicant's skill level. Each KSA subtest can be a combination of any number of assessment methods, including but not limited to: work samples, multiple-choice questions, and oral interview questions.

ACTION ITEM!!! Turn to Tab 10 and fill in the chart, which is the graphic representation of your test plan.

Step 11: Determine subtest weights.

The ImpK scores will dictate how much weight you assign each subtest.

To determine the weight of each subtest, first total the ImpK scores. Then determine what percentage of the total each ImpK score is. For example, consider these ImpK scores from this sample test plan:

KSA #	ImpK score	How tested	Subtest weight (% of 100)
Ability to 3	89	Report Writing exer.	18%
Knowledge of 5	87	M/C questions 1-15	18%
Knowledge of 11	82	M/C questions 16-25	17%
Knowledge of 13	79	Oral Interview # 3-5	16%
Knowledge of 14	75	Oral interview #1-2	15%
Skill in 29	73	Work sample	15%
TOTAL	485	TOTAL	99%

The total of the ImpK scores is 485. To determine the subtest weight for each KSA, divide each ImpK score by 485. For example for the first KSA, you would divide 89 by 485. The result is .183 or 18%. By continuing the calculations for each KSA, you will have determined how many points in a 100-point test should be distributed to each subtest.

NOTE: In the example above, the weights total only 99 because of rounding numbers to the nearest whole. This is often remedied by carrying the percentage to one or more decimal places. Or, you may assign the extra point to any of the subtests with one stipulation: a KSA lower in the hierarchy should not then be weighted more than a KSA higher up in the hierarchy. In the example above, you could add the point to any of the KSA weights except the second or the last one.

Conclusion

Although the intent of this manual is to describe a quick job analysis method, your responsibility regarding selection extends beyond the demonstrable job-relatedness of your exam. Consider the following:

A. The links between your subtests and the KSAs should be very clear, i.e., make sure you are testing what you say you are testing. The closer your test looks like actual job requirements, the more defensible the job-relatedness. This is called fidelity; and the higher, the better.

B. The pass point should be defensible. Determine, with the help of your SMEs, what score suggests minimum acceptable competence. Do not arbitrarily set the pass point at 70%. This percentage may, in fact, be too low if the subtests are easier than the skill level required of the job. The section on the Angoff Scoring Method will provide you with instruction on one way of setting a pass point for your assessment(s).

C. Consider if any subtest is "fatal." If the KSA tested is so important to overall job performance (e.g., word processing skills for an executive secretary), the test writer may determine that the applicant must demonstrate a certain level of competency. If he cannot, then he will fail the entire exam even if he performed well on all other subtests. (NOTE: This designation is supported by ImpK scores at the top of the hierarchy.)

D. How you use the resulting test scores is often scrutinized. Closely grouped scores could indicate the applicants are "substantially equal," and you may not, if a union contract is in place, be able to choose the applicant with the highest score.

Often, when considering whether or not the test or a test question is doing its job, ask yourself this:

> *"If an applicant answers this test question correctly, does it really make him or her a better Secretary? or Police Officer? or Training Officer? In other words, is the knowledge, skill, or ability measured by the question (or the subtest) similar in complexity and difficulty as that required on the job? "*

SECTION IV - Angoff Scoring Method

The Angoff Scoring Method is used to establish a passing point for selection instruments. You can use it to create a passing point for critical portions of the test that create multiple hurdles for applicants or you can create a pass point for the test in its entirety. Either way, the scores are based on SME judgments of the difficulty of the item, the necessity of the behavior for job success, and the performance of minimally qualified applicants. To ensure that the Angoff process is valid, you must start with a content valid test (the content validity of the test is established with the job analysis methods discussed earlier in this manual) and have five subject matter experts. This is more SMEs than what is needed for the actual job analysis.

In order to provide a valid estimate of the passing point, the SMEs must understand what they are doing and be comfortable with the process. Understanding the ratings and estimating the number of people who would get the question correct can be quite difficult. To do this, the SMEs will need to be familiar with the minimum qualifications and position specific minimum qualifications if you have them. So you will need to provide this information to them before they rate the items, and allow them to reference the minimum qualifications as needed.

Once the SMEs are familiar with the minimum qualifications (and position specific minimum qualifications), they should take the examination(s), write out answers to interviews, or work their way through the performance/job simulation tests. They should be permitted to grade their own tests as their test scores are not needed to establish the pass point. We have the SMEs take the test(s) so they can have a better understanding of the difficulty of the items. Once they've taken the test, the SMEs should rate ***each item*** using the following scales:

N = Necessity of the behavior evaluated by the item for job success

0 – Not Necessary
1 – Useful
2 – Important
3 – Critical or Essential

D = Difficulty of the test item as it relates to the difficulty of the work behavior

1 – Considerably Easier than what the individual would have to do on the job
2 – Slightly Easier than what the individual would have to do on the job
3 – Appropriate
4 – Slightly Harder than what the individual would have to do on the job
5 – Considerably Harder than what the individual would have to do on the job

% = Percentage of minimally qualified applicants who would get the item correct; to get this, they should answer the question:

Of 100 people who just met the minimum qualifications for this job, how many will answer the question correctly?

To simplify this step, you can ask the SMEs to only answer the item using increments of 5. An example of the rating form that SMEs will use for Angoff is in Appendix F. The SMEs should always rate the items independently. If they have questions about an item or its content, they may discuss the item with the other SMEs. However, after they have discussed the merits of the item, it is important that they make their own independent ratings.

Calculating the MAC (Minimal acceptable competency) Level

Construct a table similar to the example below for each SME. Include all of your rated test items.

Example: Rater (SME) #1

Item No.	N	D	NXD	%	MAC
1	2	3	6	.70	4.2
2	2	4	8	.60	4.8
3	1	3	3	.85	2.55
4	3	3	9	.75	6.75
			26		18.3

Where:
N = Necessity
D = Difficulty
% = The probability of minimally qualified candidate answering the questions correctly.

The steps for calculating the Angoff level for an individual item are presented below:

Step 1: Multiply Necessity by Difficulty (NXD) Example for Item 1: 2 X 3 = 6
Step 2: Multiply the product of Necessity by Difficulty (NXD) by the probability of a minimally qualified candidate answering the question correctly. Example for Item 1: 6 X 0.70 = 4.2

The steps for calculating the Angoff MAC level for a test or test section are presented below:

Step 3: Total the products from Step 1 (NXD) and the products from Step 2 (MAC). In the example above, these values are 26 and 18.3 respectively.
Step 4: Divide the total MAC estimates by the total NXD. This is the Angoff MAC estimate.

Example: $\frac{\Sigma MAC}{\Sigma NXD} = \frac{18.3}{26} = .704$ or 70% Rater #1

Step 5: Average the MAC estimates provided by the subject matter experts.

This should be calculated for the entire test or by test section.

RATER #1	.704	
RATER #2	.74	
RATER #3	.68	$\frac{3.384}{5}$ =.68 or 68%
RATER #4	.66	
RATER #5	.60	
	3.384	

The recommended passing score for our four item test is 68%.

When five SMEs are evaluating an exam to establish the MAC level, it is common to have three raters who are close together on their MAC estimates and one or two who are significantly higher or lower.

Example:	69%	69%
	70%	70%
	74%	74%
	94%	
	96%	

When this occurs, the test writer should take the average of the MAC estimates for all five SMEs (80%), as well as eliminating the extreme estimates and taking the average of the estimates for the remaining three subject-matter experts (71%). The analyst should consider both averages when setting the pass point.

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SECTION V - Appendices

Appendix A

Formulas for Task Ratings

To compute the mean ratings for the "Relative Time Spent" and "Criticality," you do the following:

"Relative Time Spent" – Add all the SMEs' ratings on the "Relative Time Spent" scale and divide by the total number of SME ratings.

"Criticality" – Add all the SMEs' ratings on the "Criticality" scale divided by the total number of SME ratings

To get the Importance of Task Index, you add the mean "Relative Time Spent" and the "Criticality" ratings.

Formula for KSA Ratings

To compute the mean ratings for the "Expected at Entry" and "Criticality," you do the following:

"Expected at Entry" – Add all the SMEs' ratings on the "Expected at Entry" scale and divide by the total number of SME ratings.

"Criticality" – Add all the SMEs' ratings on the "Criticality" scale divided by the total number of SME ratings

To get the Importance of KSA Index, you add the mean "Expected at Entry" and the "Criticality" ratings.

Formula for NP Ratings

To compute the mean ratings for the "Necessity for Performance," you do the following:

"Necessity for Performance" – Add all the SMEs' ratings on the "Necessity for Performance" scale and divide by the total number of SME ratings.

Formula for Weighted Linkage Ratings

To compute the weighted linkages, you take the sum of the Importance of Task and Importance of KSA Indexes, and multiply it by the Necessity for Performance Mean.

Appendix B

Test Log

The description of the steps taken in the development of the test for

_____
(Insert position title and position control number here)

Step 1: Enter today's date and the name and title of person directing this job analysis.

Name_____

Title_____

Date this job analysis began_____

List (or attach) pertinent details and milestones in the development of this job analysis:

(Continue on additional pages as needed.)

Step 2: SME Identification

Enter the names and titles of those serving as Subject-Matter Experts.

SME 1

Name_____

Title_____

SME 2

Name_____

Title_____

SME 3

Name_____

Title_____

SME 4 (optional)

Name_____

Title_____

Step 3: Position Description Drafting/Revision

Attach a copy of the revised PD here. (Your working document(s), with your handwritten notes, are preferable here; they will show your good faith efforts at establishing content validity.)

Enter the names of the SMEs who reviewed the PD.

SME_____

SME_____

SME_____

SME_____

SME_____

Enter the date* of the review.

Date of the review_____

* If the review spans several days, list the beginning date of the review and the date the PD review was completed.

PD review beginning date: _____

PD review completion date: _____

Step 4: Assign a value to each duty on the PD.

Describe your method:

--OR --

Use the paired comparison method:

Which is more important, Duty 1 or Duty 2?	1	2	Equal
Which is more important, Duty 1 or Duty 3?	1	3	Equal
Which is more important, Duty 1 or Duty 4?	1	4	Equal
Which is more important, Duty 2 or Duty 3?	2	3	Equal
Which is more important, Duty 2or Duty 4?	2	4	Equal
Which is more important, Duty 3 or Duty 4?	3	4	Equal

Enter a hash mark in the space provided below each time the duty was selected "more important" or "equal" to:

	Hash marks	Total	Value assigned *
Duty 1			
Duty 2			
Duty 3			
Duty 4			
Duty 5			

*Always assign the lowest ranking duty (or duties) a value of at least "1"; add the # of hash marks earned by every other duty to arrive at its value. For example, if Duty 2 received two hash marks, add that # to 1 for a total value of 3.

Steps 5: Enter the information obtained in Steps 4 on the chart below.

Duty #	Value of duty (criticality)	X (times)	Frequency (% of time spent)	=	Importance of Duty Score (ImpD)
1		X		=	
2		X		=	
3		X		=	
4		X		=	
5		X		=	

Step 6: Rating KSAs (Determining KSA Hierarchy)

Please distribute the points available among the KSAs listed in proportion to their criticality in successfully performing the duty. Please note that not all KSAs must be assigned points; you may distribute points among only the most important of the KSAs listed if you choose.

SME #1 Duty # _____

KSA	KSA description	Points of _____

Rater's (SME) name_____

Date_____

SME #2 Duty # _____

KSA	KSA description	Points of _____

Rater's (SME) name_____

Date_____

SME #3 Duty # _____

KSA	KSA description	Points of _____

Rater's (SME) name_____

Date_____

STEP 7: KSA Tally Sheet

KSA #	SME #1	SME #2	SME #3	TOTAL	TOTAL ÷ (# of SMEs) (ImpK score)

STEP 8: **KSA Hierarchy**

Using the list from Step 7, list the KSAs by ImpK score in descending order.

KSA	ImpK score

[redacted]

ImpK Scores

KSA #1	162
KSA #2	155
KSA #3	142
KSA #4	141
KSA #5	77
KSA #6	50
KSA #7	12

STEP 9: Determine Cut-off Score & Rationale

The SMEs determined to include the following KSAs in the selection plan for the following reasons:

_____
_____
_____
_____
_____

STEP 10: Test Plan

KSA	Written Test	Job Sample	Oral Interview	Other (Specify)

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