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Introduction

Job analysis and work analysis cover a host of activities, all of which are directed toward discovering, understanding, and describing what people do at work. Although work analysis is the more inclusive term, covering analysis of team functioning, work processes and systems as well as jobs, we bow to tradition and use most often the term *job analysis* in this book. Job analysis and work analysis are important because they form the basis for the solution of virtually every human resource problem. Such problems can be illustrated by a couple of chats we had recently.

Robert Hart (not his real name) is vice president of human resources for InDigital (not the real name of the company, either), a rapidly growing supplier of computer hardware to computer retailers. InDigital uses a test as part of the hiring process for the job of senior sales associate. The test indicates whether sales associates have the knowledge needed to do the job. The test has items about computer hardware, such as what a hard drive is, and items about operating the sales computer system, such as what screen to use to place an order. As a government contractor, InDigital must obey laws that apply to companies receiving federal money. Recently, InDigital was audited by the U.S. Office of Federal Contract Compliance Programs, which enforces laws about equal employment opportunity. The Office of Federal Contract Compliance Programs auditor said to Robert, "Tell me about this *test* you are using for promotion." Robert said, "Oh, that's not a *test*. It's just a little *screen,* you know." It probably will not surprise you to know that the auditor was not satisfied by Hart's attempt to get off the hook. Hart then called us and asked for some help in showing whether the test is a solid indicator of sales knowledge, as required by the Office of Federal Contract Compliance Programs.

Karen Shartle is the owner of Clear Vision, a retailer that produces eyeglasses and contact lenses for customers in about an hour. Karen has three stores, each of which has an optometrist or two on staff, some lab workers, and

some salespeople who help clients decide what glasses to buy. Karen called for help with her pay rates. She is having trouble attracting and keeping staff in her stores, and she thinks that her pay scale for the jobs in her stores may be out of line with the pay scales used by others in this industry.

The solution to both of these problems begins with job analysis. Before we can determine how well the test works or what is the proper pay for a job, we need to know what the job is. For the testing problem, we then need to know what knowledge is required to perform the job successfully. For the compensation problem, we need to know the pay of other similar jobs. And for other problems, we need to know special aspects of jobs or of people. In subsequent chapters, we detail several methods for conducting a job analysis to solve problems like these. In the remainder of this chapter, we will (1) present an overview of the book, (2) identify the uses of job analysis, (3) define key terms, (4) describe the major building blocks of job analysis methods, and (5) present a couple of examples of job analysis projects we have completed to whet your appetite for what is to come.

Overview of the Book

As we just noted, Chapter 1 includes definitions and a brief coverage of the uses of job analysis. This chapter is intended to show the practical importance of the material covered in the subsequent chapters. The next four chapters describe the most important techniques of job analysis, with emphasis on those methods that can be used for more than one purpose. Chapter 2 focuses on work-oriented methods, that is, methods that center on what gets done. For example, in the job of auto mechanic, a work-oriented method would focus on tasks such as adjusting brakes. Chapter 3 focuses on worker-oriented methods, that is, methods that center on how the worker does the work. For example, in the job of mechanic, the analysis might focus on the knowledge or judgment used to select the proper tool for the job. Chapter 4 focuses on hybrid methods, that is, those methods that try to gather work- and worker-oriented information simultaneously. Chapter 5 focuses on techniques used to analyze managerial jobs and methods for analyzing the jobs of teams.

Chapter 6 covers job analysis and the law. We mention the most important statutes and describe their implications for conducting job analysis in such a way as to keep out of legal trouble.

The next two chapters describe applications of job analysis. We focus on how best to "marry" the purpose and method (shotgun marriages are not included); we also describe and critique research literature that is relevant for each of the topics. Chapter 7 covers several common human resource

applications, including job descriptions, performance appraisal, compensation, and job design. Chapter 8 covers topics most dear to the heart of many an industrial psychologist, namely, staffing and training. Please bear in mind that job analysis is a tool to help us achieve goals in the areas named, not an end in itself. A theme that comes up over and over again is that the purpose we have in mind, and our limits in terms of money and time, will dictate the type of job analysis we do.

The final two chapters cover two rather different topics. In Chapter 9, we discuss doing a job analysis study. We offer a theoretical rationale and practical advice about planning and organizing a job analysis study and collecting and analyzing data. Although such information can be found in other texts, it is not usually found in a single, handy place (if we do say so ourselves), nor is it usually organized with practice in mind, as it is here. Chapter 10, the final chapter, focuses on the future of job analysis.

We have also prepared a small Web site to give supplemental materials that you might find useful. To see it, set your browser to http://jobandworkanalysis .com.

The Uses of Job Analysis

Job analysis is used for a large number of purposes. Several authors have developed lists of such uses, including Ash (1988), Ash and Levine (1980), McCormick (1979), Prien and Ronan (1971), and Zerga (1943). Our list follows but updates that of Ash (1988) and Ash and Levine (1980). The list covers purposes of interest to organizations as they manage their workforces.

1. *Job description.* A job description is a brief written description of work—it's a snapshot intended to communicate the essence of the job. A job description usually contains identifiers (job title plus other classifying information), a summary (mission or objective statement), and duties and tasks (what gets done), and it may contain other information such as reporting relations, accountability, and minimum qualifications. Among other things, job descriptions are important for communicating the nature of the job to someone who doesn't already know what the job is.

2. *Job classification.* Job classification is the process of placing one or more jobs into a cluster or family of similar jobs (for example, because of its requirements, a job is classified, say, as a Programmer Analyst III). The family may be based on lines of authority, duties, and responsibilities of the work or behavioral requirements of the job. Job classification can be important for setting pay rates and selecting employees.

3. *Job evaluation.* Job evaluation is the process of establishing the worth of jobs to an employer. Employers want the pay for various jobs to match their value

in relation to one another within the company and to stack up well against pay rates offered by other companies. By maintaining fair pay, job evaluation helps to attract and retain people.

4. *Job, team, and system design and redesign.* Job design is the process of bundling tasks or clusters of tasks into a collective called a job. Job design is necessary whenever a new job is created. Team design is the process of bundling tasks or clusters of tasks for a team of workers as opposed to individuals. Systems design overlaps with team design but also attends to assigning tasks to equipment and people in the system. Job, team, and system redesign is the sorting of tasks to replace old jobs and functions with new ones. Job redesign is often part of an effort to increase work efficiency. It may also be conducted to increase employee satisfaction, motivation, safety, or product quality. In today's dynamic business climate, many jobs are being redesigned almost on a daily basis.

5. *Human resource requirements and specifications.* Human resource requirements refer to human attributes necessary or desirable for performing the job. Such attributes are often thought of as knowledge, skills, abilities, or other characteristics (KSAOs). For example, an accounting job might require skill in using a 10-key adding machine (or keyboard). Job specifications refer to minimum qualifications or experience that employers require for the job (for example, a college degree in engineering, 6 months of experience as a cashier). These specifications can be used to inform job applicants and staff charged with screening applicants about the standards the applicants must meet.

6. *Performance appraisal.* Performance appraisal is the process of evaluating the job performance of individuals (and now teams) who have been working for some period. Usually, performance appraisals are completed by management and used to help make decisions about raises and promotions and to give workers feedback about their performance. They are sometimes used as motivational tools. Because of equal employment opportunity laws, it has become increasingly important to tie performance appraisals to important tasks and work behaviors required by the job.

7. *Training.* Much of what workers need to know, think, or do to perform successfully on the job is learned after they are hired. Training is the process by which such learning takes place. Job analysis informs the development of training by identifying the key KSAOs job incumbents need to perform the tasks of a job. Once it is clear what KSAOs job incumbents still need to develop, appropriate training can be designed.

8. *Worker mobility.* People move into and out of jobs, and sometimes occupations. It is generally in everyone's best interest that people and jobs fit together well. Career counseling provides individuals with information about jobs and about themselves that is intended to promote beneficial worker mobility. Some organizations provide formal career ladders or paths that are intended to foster skill development and occupational success for individuals.

9. *Workforce planning.* Workforce planning is essentially the flip side of worker mobility. Organizations want to plan for jobs that will need to be filled and to

be confident that qualified applicants will be available to fill them. Job analysis can indicate the KSAOs needed to be successful in a particular job. Organizations can then design selection and training programs to ensure that applicants will possess the needed KSAOs.

10. *Efficiency.* Improving efficiency at work includes things such as shortening the work process or making it easier to do, for example, (1) reducing the number of physical movements in a repetitive task, (2) developing work aids (perhaps a checklist giving all the needed steps for completing a job), or (3) designing better tools (such as a shovel of a certain size).

11. *Safety.* Job analysis can identify specific behaviors and working conditions that increase the chances of accidents and injury. Improving safety can involve changes in the work process, the development of work aids and tools, or changes in the work context (work environment).

12. *Legal and quasi-legal requirements.* Several different laws apply to conditions of employment, including hiring, training, paying, promoting, and firing employees. Several governmental agencies are charged with enforcing such laws. The agencies include, among others, the Equal Employment Opportunity Commission (EEOC), the Office of Federal Contract Compliance Programs (OFCCP), and the Occupational Safety and Health Administration (OSHA). Each agency has sets of guidelines intended to help employers to comply with employment laws. Job analysis is used to describe jobs and worker qualities so that interested parties can determine whether employment practices serve to improve productivity and efficiency and do not unlawfully discriminate against people.

Some might argue that our list of purposes is not complete, that there are other purposes to be served by job analysis. Well, yes, such purposes include quality of work life, stress management, and finding employment for the hard-core unemployed. Some might choose test development as a category. Or we might have added a "miscellaneous" category, except we wanted to avoid 13 purposes. For the sake of harmony, let's assume that the list is reasonably but not totally complete.

Actually, the major category missing from our list is what might be called "societal purposes" for job analysis, purposes that extend beyond the boundaries of any single organization. Some examples include *vocational guidance,* where school-based counselors or counselors in private practice help people find occupations that match their aptitudes and interests; *labor market data,* where job information is used as a basis to report unemployment rates or rates of creation of new jobs; and *skills transferability,* where rehabilitation counselors help disabled or displaced employees move from one type of job or occupation to another. Such are topics for other books.

The 12 purposes in our list are not necessarily exclusive of one another. For example, job classification and job evaluation both can affect pay rates. Changing a job through job design most likely will create a need for training

and could change the job requirements and performance appraisal techniques. A single job analysis may be conducted to accomplish several purposes at once. Most of the job analysis techniques described in this book are intended to serve multiple purposes. The take-home message of this section of the chapter has been that job analysis helps to solve practical problems at work and forms the foundation for virtually every human resource management system.

Definitions

Various authors use terms such as *job, position,* and *task* to mean different things. It is important to define terms so that we can communicate effectively. Our scheme is to define a job by approaching it from both ends of the work content spectrum, both the very broad and the very narrow. We begin by working from the very broad end of the spectrum. At the broadest level, we have the entire world of work. This includes all jobs and, because it fails to make distinctions among them, isn't very useful in practical work. Immediately below this level is the *branch.* An example of a branch of the world of work is the public safety branch, which encompasses all those jobs whose content deals with such duties as law enforcement, security, and firefighting and with the effects of natural disasters. The world of work can be divided into about a dozen branches. Each branch can be further divided into about a dozen *groups.* An example of a group within the public safety branch would be law enforcement jobs. Proceeding downward toward our target concept of the job, we can divide groups into a set of *series.* The sworn law enforcement officer series, for example, would include police officer, detective, police sergeant, lieutenant, captain, and major.

Finally, we arrive at the term *job.* An example of a job in the sworn law enforcement officer series might be police officer. A job refers to the work content performed by a group of people with similar work, such as the work described by the title "police officer." The definition of the term *job* is still a bit vague at this point. We will return to it after building up toward the job from the smallest pieces of work content.

The smallest unit of work that can be identified as having a clear beginning, middle, and end is called an *element.* An example from the police officer job would be dialing the telephone. Another way to think about an element is that any smaller unit of work content would require descriptions of physical motions or sensory processes. For example, to dial the phone, you have to pick up the handset and punch in a series of numbers. Reaching for the phone, grasping it, moving it toward the ear, listening for the dial tone, and so forth are all considered here to be physical motions or sensory processes rather than elements of work content.

The next larger unit of work is called an *activity.* Activities are clusters or groups of elements directed at fulfilling a work requirement. A police officer uses the telephone on many occasions as part of the activity "Answering calls related to landlord-tenant disputes." When a job is analyzed down to the level of activities, you might expect to find more than a hundred activities in a typical job and several hundred activities in more complex jobs.

Tasks are collections of activities that are directed toward the achievement of specific job objectives. An example of a task for police officers might be "Talks to conflicting parties to settle disturbances." A thorough job analysis for a typical job will usually produce from 30 to 100 tasks. Tasks have a clear beginning, middle, and end. The end of the task is linked directly to the goals of the job. In the previous example, one of the goals of the job is to settle conflicts.

The next larger unit is the *duty.* This is a collection of tasks all directed at general goals of a job. For police officers, a duty might be "Vice activities," which would include apprehending drug users and sellers, answering calls related to gambling and pornography, and so forth. A thorough job analysis might produce 5 to 12 duties for a typical job.

A *position* is a set of duties, tasks, activities, and elements able to be performed by a single worker. In our terminology, each employed person has a position rather than a job. The *job* is defined as a collection of related positions that are all similar enough in terms of the work performed or in the goals that they serve for the organization so that everybody in the organization agrees to call the positions by the same job title. A recap of the definitions of terms is provided in Table 1.1, using another facet of police work.

We can think of job analysis using a short definition or a long definition. First, the short definition: *Job analysis* refers to the process of discovery of the nature of a job. This is the essential feature of job analysis, and is easy to

Table 1.1   Examples of Defined Terms

Term	*Example*
Branch	Public safety
Group	Law enforcement
Series	Sworn law enforcement officers
Job	Police officer
Position	Janet O'Mally, Police Officer, District A
Duty	Traffic enforcement
Task	Issue tickets to violators
Activity	Pull motorist over
Element	Switch on siren and lights

remember. However, it isn't as sharp a definition as we would like. Three additional features help shore up our definition. First, to qualify as a job analysis, a systematic procedure is necessary. The procedure involves a number of steps that are specified in advance by the particular method chosen by the *job analyst,* that is, the person analyzing the job. Second, the discovery must proceed by breaking the job up into smaller units. The units could be duties, tasks, activities, or elements. On the other hand, the units might be rather different entities, such as requirements for visual tracking, problem solving, or grasping long-handled tools. Third, the job analysis must result in some written product, either on paper or in electronic form. The job analysis can result in any number of different products, such as a job description, a list of tasks, or a job specification.

To be valuable, a job analysis must be systematic, careful, and thorough. Now, the long definition: *Job analysis* is the systematic process of discovery of the nature of a job by dividing it into smaller units, where the process results in one or more written products with the goal of describing what is done in the job or what capabilities are needed to effectively perform the job.

You may be worried about the distinctions among the levels of the spectrum of work. "How can I tell an activity from a task from a duty?" "Well," we respond, "don't worry; be happy." It turns out that the level (broad to narrow) will depend on what you are doing with the information and that this will tend to be clear when you start the project. For example, if you are doing job evaluation, you will want a few broad descriptions of work, but if you are developing off-the-job training, you will want very specific, step-by-step descriptions (maybe even elements). So bottom line, worry about getting the information to serve the purpose for which you are doing the job analysis rather than making fine discriminations among terms.

Building Blocks of Job Analysis Methods

Job analysis methods are made up of a large number of building blocks, but these all fall into four categories:

1. Kinds of job *data* collected

2. Methods of *gathering* data

3. *Sources* of job information

4. Units of *analysis*—what gets analyzed, including the level of detail

At this point, you might be thinking, "At last! Just what I always wanted to know!" On the other hand, you might be thinking, "Why have we got another list in this chapter?" To be an effective job analyst, you have to know what you

are doing, and that means making lots of choices about the methods you use. To make informed choices about the methods, you first need to know what the choices are. The choices are what this list is about. It may help to think about the choice you would have to make to analyze a specific job (perhaps a job you might want someday) while reading through the building blocks. We describe each component of a job analysis method in some detail.

KINDS OF JOB DATA COLLECTED: DESCRIPTORS

Designers of job analysis methods usually have some purpose in mind for their method, and they design it so that the kinds of data collected will serve that purpose. For example, those who want to develop tests for selecting new employees will typically collect data about employee characteristics, such as abilities or skills. The following list runs from more general kinds of data to more specific kinds of data and is aimed at the study of jobs performed by individuals rather than work teams.

1. *Organizational philosophy and structure.* This type of data reflects the way that a job fits into the organization and its mission. For example, if we analyze the job of prison guard or correctional officer, we will try to determine whether management views the job as serving a rehabilitative function or a custodial function. We can expect a correctional officer who is viewed as a rehabilitator to spend more time with inmates, to interact more pleasantly with them, and to offer counseling on a variety of issues. The correctional officer who is a custodian is more likely to watch rather than interact with inmates, to speak curtly and formally to them, and to refer requests for advice and help to workers designated as counselors.
   The organizational structure refers mainly to an organizational chart. This type of information reveals what the relationships among jobs are and the nature of the supervisor/subordinate reporting relationships. A chart showing that electricians have apprentices reporting to them suggests imme-diately that at least a part of the electrician's job consists of training activities.

2. *Licensing and other government-mandated requirements.* These require-ments may influence a job's content directly or may place limitations on the type of person who may hold the job. For example, in health service organizations, there are a number of professional jobs that may require suitably licensed or certified practitioners, the prime one among them being the physician. Water and wastewater treatment plant operator in water and sewage treatment facilities is another example of a job that requires a state license. Such licensing requirements may foster studying, training, and other activities in the job so that the worker may acquire and retain the license.

3. *Responsibilities.* Information about responsibilities tells us what types and levels of authority and accountability a jobholder has. For example, when

analyzing the job of bank manager, it may be helpful for a job analyst to know whether a manager can approve loans, and if so, how large the amounts of the loans may be.

4. *Professional standards.* Workers who consider themselves to be professionals usually form professional associations (for example, the Society for Industrial and Organizational Psychology, the American Medical Association, or even the National Federation of Associations, which is dedicated to the spirit of joining). These in turn are likely to establish standards of conduct that affect the performance of a job. For example, psychologists who use or develop tests in their jobs are guided by the testing standards of the American Psychological Association. A professional psychologist who is involved in testing clients, applicants, and employees must adhere to these standards or risk censure and expulsion from the association.

5. *Job context.* Information about job context deals with the environment that surrounds the job. Is the work conducted in a hot or a cold climate? Indoors or outdoors? In a dangerous setting or a safe one? Are workers crowded together or separate? Are workers paid by the piece or by the week? Are workers on rotating shifts or standard work schedules? All these and other questions provide an understanding of the setting within which job activities take place.

6. *Products and services.* Information on the products and services produced by the worker in a job is often critical for insight into the nature of the work. Take the activity of throwing pots (making ceramics). If we can see the bowls, pots, coffee cups, and other products produced by the potter, we would learn quite a bit about the nature of the activity (turning, pinching, glazing, firing, and so on). Notice that most of this stuff is perfectly round. But, is there something different about the handle of the coffee cup? Or consider a chiropractor. We would learn a great deal about the job by watching a chiropractor apply forces of various kinds to patients' backs. What about the use of hands, machines, and other devices?

7. *Machines, tools, equipment, work aids, and checklists.* Some jobs rely heavily on machines, tools, and equipment. Skilled craft jobs such as plumber and electrician are key examples. A full understanding of these jobs would be impossible without an inventory of the tools, machines, and equipment used in the job. We once reviewed applications for the job of printer. Under the description of duties, the applicants listed only the brands and model numbers of the printing machinery they operated. Some jobs are named for the machine, such as "forklift operator." Work aids and checklists refer to guides for the worker that tell what sequence of steps must be carried out to complete a task. A pilot must follow a rather extensive checklist before takeoff to ensure that the plane is safe and ready. Such work aids are treasure troves of information for the job analyst.

8. *Work performance indicators.* Information on work performance might include the length of time it takes to complete a task, standards on quality of performance required, and standards that specify the manner in which activities may be carried out. There is some overlap here with professional standards, except

that work performance standards are set by companies, factories, or public agencies themselves, not by professions. Organizations may establish such standards to show what constitutes a fair day's work, or what amount of scrap or waste can be tolerated.

9. *Personal job demands.* Information on personal job demands might touch on physical demands. For example, an analyst might need to know if the job requires climbing, bending, crouching, or lifting heavy objects. In addition, a job analyst might explore the physical costs to the worker in terms of fatigue, consumption of a certain amount of oxygen, and enduring the stress of heat, cold, or gravity. The job of astronaut is one for which these types of data are critical. Likewise, the job analyst might need to know about social and psychological demands. Does the job call for unusual work schedules, intense periods of concentration, or long periods of time when a worker must remain alert but nothing happens? A police officer's job is a case where these kinds of job aspects are important.

10. *Elemental motions.* For certain jobs in which many complicated maneuvers are made very quickly, such as a professional football player, the analyst may have to pay attention to the individual elements that make up these maneuvers. Otherwise, the analyst would not understand tasks like blocking or tackling. Assembly jobs are another example.

11. *Worker activities.* This kind of information attempts to look at the job from inside the worker looking out. As a result, it focuses on the worker's mind, senses, and ways of responding to situational demands. Thus, making decisions, interpreting visual information, solving a work problem, planning a correct response, and making the response all fall under this category of data. Viewing jobs in this way, job analysts can analyze many different kinds of jobs into a common set of worker activities. Recently worker emotions have become a focus of interest, and indicate what kind of emotional responses and displays the worker is expected to engage in. Some refer to this as "emotional labor."

12. *Work activities.* Unlike *worker* activities, data on *work* activities come from a vantage point outside the worker and are based on the observable behaviors of the worker. Thus, fixing a flat tire, typing a report, and giving aspirin to a patient are examples of the kinds of data we get when we focus on work activities.

13. *Worker characteristic requirements.* What are the skills, abilities, knowledge, attitudes, values, and personality traits needed to perform a job? Does the job require people who are extroverted, methodical, expert in a computer language, or proficient in dancing? This type of data is what we are after when we study a job's worker characteristic requirements. For activities such as employee selection and training, this type of information is usually critical.

14. *Future changes.* A careful job analysis may consider changes to the mission or goals of the work and also changes to the tasks, particularly through changes in the machines, tools, equipment, and work aids. For many jobs, new technology is being introduced that changes the nature of the tasks to be

performed. Depending on the purpose of the job analysis, the changes may be quite significant. For example, if the main part of the job is operating a complex piece of machinery and the whole interface between the person and the machine will be changing in 6 months, it makes little sense to devise an extensive training program for the current machine. Instead, it might make more sense to devise training for the new machine.

15. *Critical incidents.* Critical incidents are short stories about particular instances of either outstanding or poor performance. Each must include the conditions and the problem faced by a worker, what the worker did, and the outcome. A critical incident of outstanding performance for the job of first-line supervisor in an electric power plant might be, "The supervisor smelled a poisonous gas. He immediately donned a gas mask and evacuated the area. Then he spotted the source of trouble, shut down the equipment, tagged it, and had a mechanic repair it. Before shutdown he notified the operator to get another unit in service so the supply of electricity was not interrupted."

Table 1.2 lists each of the kinds of data that an analyst might collect and examples of most kinds of data taken from the job of a police officer. In particular situations and to accomplish the purposes of a job analysis, the list of descriptors may need to be expanded or refined. For example Morgeson, Delaney-Klinger, and Hemingway (2005) found that role breadth was importantly implicated in job performance. They defined this variable as the sheer number of tasks incumbents claim to perform. The greater the number, the better was the performance in their study. In the context of teams and team training, Levine and Baker (1990) added such descriptors as team mission. The Occupational Information Network (O*NET) is designed to serve society at large and so has a much more elaborate set of descriptors than the list presented here. Chapter 4 covers the O*NET system in detail.

METHODS OF DATA COLLECTION

Having selected the types of data you want, you now have to figure out the ways to gather it. The list that follows covers the methods that job analysts use for data collection.

1. *Observing.* A job analyst may learn a good deal about a job simply by observing and recording what a worker does. Naturalistic observation occurs when the analyst's presence has little or no effect on the worker's behavior. This can be achieved by conducting observations over a long enough period of time that the worker no longer pays any attention to the analyst. Or the analyst may observe more actively by asking questions about particular behaviors as they occur. An example of the latter approach is the ride-along process when a police officer's job is being analyzed. The police officer typically explains the reasons for certain actions and responds to questions posed about work behaviors by the job analyst during an 8-hour shift in a patrol car.

Table 1.2   Examples of Descriptors

Descriptor	Example for the Job of Police Officer
Organization philosophy and structure	To protect and serve the public; paramilitary structure; reports to sergeant
Licensing and other government-mandated requirements	Certification as a peace officer by the State Police Officer Standards and Training Board
Responsibilities	Decides when to use deadly force
Job context	Physical danger; work on holidays; may involve working around horrible smells (for example, arresting an advanced alcoholic); rotating shifts
Products and services	Enforces traffic laws; assists stranded motorists
Machines, tools, work aids, and equipment	Computer, flash light, handcuffs, "Miranda" card, patrol car, regulation firearms; computer terminal
Work performance indicators	Arrest records
Personal job demands	Periods of inactivity followed by exertion; may involve climbing, sprinting, crouching, and so on; long periods of driving and sitting in patrol car
Elemental motions	Applying a choke hold
Worker activities	Decide whether vehicle registration has expired
Work activities	Write traffic ticket
Worker trait requirements	Honesty; drug avoidance
Critical incidents	Although off duty, Officer Brandon noticed two motorists who were about to come to blows over a parking space. She stopped them from shouting at one another and got them to choose the winner by flipping a coin. The winner parked and the loser drove away without further argument.

The willingness to get out in the field with a worker often has a side benefit over and above the gaining of familiarity with the job. When observation is part of the analysis, the job analyst often gains increased acceptance and increased credibility among workers and supervisors in the organization. Martinko (1988) offered some helpful hints about how to observe employees working. Capturing a representative sample of work activity during periods of observation is critical.

2. *Interviewing individuals.* In this method, the job analyst asks questions of jobholders and supervisors about a job under study. The interviews are typically based on what took place during some period of time, such as the previous day, week, or month. Carefully planned and structured interviews will typically work best.

3. *Group interviews.* A group of knowledgeable workers and supervisors may be assembled for the purpose of discussing a job. Group interviews offer the advantage of making more efficient use of the analyst's time. Also, fewer burdens are placed on the analyst when it comes to integrating the information that might be gathered in a series of individual interviews.

4. *Technical conference.* A technical conference involves meeting one or more experts to better understand the reasons for the existence of a job. For example, for a sewage processing technician job, a staff chemist might be interviewed to better understand how sewage is purified. This allows the analyst to understand the functions of the technician's equipment.

5. *Questionnaires.* Questionnaires may be considered self-administered interviews that are typically very carefully structured and pretested. Often the items on a questionnaire are tasks or activities, and workers are asked to evaluate the tasks on one or more different scales. One such scale might be how difficult each task is to perform.

6. *Diaries.* The diary is a method in which incumbents write down periodically the activities they have been engaged in at a particular time. Diary keeping may require that workers make an entry each time they switch tasks. Still another approach to diary keeping may involve making entries every half-hour to indicate what the worker has done during the preceding half-hour. Typically, diaries are kept over a 2- to 3-week period.

7. *Equipment-based methods.* Sometimes a job analyst may collect data about jobs by using equipment of some sort. Most commonly, the equipment might consist of a recording device such as a camera, videotape recorder, or audio-tape recorder. If the nature of the data to be collected bears on the physical demands on a worker, then measuring devices such as electrocardiograms might be used.

8. *Reviewing records.* A job analyst will often find a great deal of useful information in company records. Previous job performance appraisal material, position descriptions, accident reports, correspondence that is issued by a worker, and examples of other work products contained in records are illustrations of the kinds of things a job analyst might look for.

9. *Reviewing literature.* A job analyst may consult reports and books produced inside a particular organization or outside of it. The inside materials might include training manuals, training materials, checklists, and user manuals. Materials from outside the organization might include books about particular occupations, job analysis studies conducted in other settings that are summarized in report form, previous job descriptions, or published job analysis databases.

10. *Studying equipment design specifications.* Where a job is heavily dependent on equipment or machinery, a job analyst may learn a great deal about the job by studying material such as blueprints or schematic drawings. These may provide insight into how the worker must interact with the particular piece of equipment.

11. *Doing the work.* Although rarely done in practice, analysts may sometimes decide to learn about the job under analysis by actually doing it. This approach is usually limited to simple jobs, and where errors in performance are not highly critical. Thus, an analyst would not want to engage in the work of a brain surgeon but might serve as a baker's assistant or a trucker's helper. However, not all such projects are dull. We know of one analyst who learned to fly an airplane as part of a job analysis project.

SOURCES OF JOB ANALYSIS DATA

Because the sources of data are, with only a few exceptions, indicated by method of data collection, we merely list them here. Where the connection is not obvious, we offer a few words of explanation. Sources that may supply job analysis data include the following:

1. The job analyst

2. The jobholder's immediate supervisor

3. A high-level executive or manager

4. The jobholder

5. A technical expert such as a chemist or college professor

6. An organizational training specialist

7. Clients or customers

8. Other organizational units

9. Written documents (for example, records, equipment specifications)

10. Previous job analyses

Two members of the list probably need a bit of explanation. Clients or customers offer a special perspective on how a job should be done. Their

information may help to establish standards of performance or to suggest tasks that need to be done but are not currently being done by a worker. In this age of concern about customer service and customer satisfaction, the customer is more and more frequently used. Including clients may also serve a political purpose. We recently involved community members in the analysis of police officer jobs in part to show community involvement in the job analysis and also to increase community acceptance of the resulting job description. Organizational units that interact with the unit where a job being analyzed is situated may be quite helpful in clarifying how the job fits into the total organizational scheme. For example, we might ask employees in the human resources department of a company how they work with the research and development department. Other organizational units may be internal customers of the job where clients are external customers of the job.

UNITS OF ANALYSIS

When designing the job analysis method, we have decided to collect certain kinds of data, to collect it by means of a particular method, and to enlist the aid of specific sources for our data. Now we need to attend to the issue of how we will summarize, analyze, and report the data. We describe here nine methods of data analysis and reporting. Some of the data analytic strategies overlap with the kinds of job data collected, discussed earlier. This is because the kind of job data collected may not necessarily be the end product we desire. For example, we may collect work activities, but we may analyze the activities by listing the worker characteristics needed to perform the activities. Or we may collect information on duties and tasks, but group them into job dimensions. For example, duties and tasks related to assigning work to others, evaluating others, and assisting others' progress may be grouped into a job dimension called "leadership."

1. *Duties.* We may collect a host of different kinds of job data from numerous different sources by various means and summarize it by describing the dozen or so major duties performed by people in a particular job. Because statements of duties capture a great deal of information about a job in a relatively few words, the use of duties as a mode of analysis may be helpful for such functions as job evaluation and classification or creation of job families. An example of a duty might be "Preparing and managing a budget."

2. *Tasks.* Rather than analyze at the level of duties, we may decide to summarize our data in the form of tasks. Tasks may lend themselves to a variety of applications where the need for a relatively comprehensive picture of the job exists. Employee selection is one such application. We might be able to transform one or more tasks directly into a work sample test, in which applicants are scored on their ability to perform important parts of the job.

3. *Activities.* Activities often serve as the items in questionnaires that are sent to incumbents and their supervisors for completion. They are quite efficient in this role, and the job analyst may be content to report them in the form of activities, rather than combining the data into tasks or duties.

4. *Elemental motions.* Job analysts who are concerned about the most efficient ways to do physical work usually will summarize their data in the form of elemental motions. Such detailed information may prove helpful in designing work and in teaching new workers how to accomplish a task. We once toured a friend's bakery. During the tour, he asked for help in making rolls, and he demonstrated how to shape the rolls by hand. His movements were quick and sure and inevitably resulted in a near perfect roll. After several attempts, we gave up because we just could not make a good-looking roll. But if we had had a slow-motion video to watch with stop action and a list of elements, we might have been more successful.

5. *Job dimensions.* We may take a variety of job analysis data and summarize the data in the form of basic job dimensions. These are different from duties because they focus on the workers' sensory and mental processes as well as the workers' modes of response. Examples of job dimensions are "Organization of work," "Planning," and "Decision making." The *Position Analysis Questionnaire* method of job analysis (described in Chapter 3) relies on job dimensions that have been derived from careful research. These job dimensions are groupings or clusters of the worker activities we described under the heading "Kinds of Job Data Collected." Other systems of job analysis also deal with job dimensions. In the *Threshold Traits Analysis System* (see Chapter 3), two out of a larger number of job dimensions are "Vigilance and attention" and "Application of information and skill."

6. *Worker characteristic requirements.* Sometimes a job analyst may be content to analyze and summarize job data in the form of worker characteristic requirements. Some methods of job analysis have predetermined listings of characteristic requirements. Two examples of such methods are (1) *threshold traits analysis,* which uses 33 worker traits, such as "creativity" and "oral expression," and (2) *task analysis* as conducted by the U.S. Department of Labor, which uses a fairly comprehensive list of worker attributes including cognitive abilities, interests, and temperaments. Other methods of job analysis rely on listings of worker characteristic requirements that are developed for particular jobs. The *job element method* (see Chapter 3) focuses only on worker characteristic requirements and generally yields a listing of 50 or more types of knowledge, skill, ability, and other characteristics that a worker must possess to do the job under analysis.

7. *Scales applied to units of work.* Some job analysts may not be content to list all the tasks or duties or activities or dimensions of a job. Rather, they go further and apply a number of scales to the activities, tasks, or duties they choose. Such scales allow analysts to make judgments about a number of things. For example, the use of such scales may indicate how difficult or important a task is for a job relative to other tasks. Scales may also be used to indicate the extent to

which particular tasks involve certain kinds of interactions with data, people, or things. The data, people, and things scales are part of the job analysis method called *functional job analysis,* which is described in Chapter 2. Scales may also be devised for particular applications. For example, if an analyst is interested in building a training program, he or she may develop a scale to assess how difficult a task is to learn.

8. *Scales applied to worker characteristic requirements.* Just as scales may be applied to units of work, so may they be applied to worker characteristics. For example, a selection specialist may wish to know which among a large number of job-related abilities are the most important ones to measure. The job element method of job analysis includes scales to measure whether particular abilities or skills can distinguish between superior and average workers, and such scales help determine what abilities are most important. Some scales try to gauge the extent to which characteristics are needed to carry out tasks. Information about closely linked task-trait combinations can be useful for designing a training program.

9. *Qualitative versus quantitative analysis.* Last but not least in this list is the extent to which each job analyst relies on narrative descriptions of what has been found rather than statistical analysis of numbers derived from scales. As job analysis becomes more and more scientific, there seems to be more reliance on numbers. But qualitative descriptions still have their place in such documents as job descriptions.

SUMMARY OF THE BUILDING BLOCKS

Table 1.3 provides a checklist of each of the four kinds of descriptors and their elements. This could come in handy if you are either planning a job analysis or reviewing one.

A Couple of Job Analysis Projects

You want to get your hands in to see how things work, do you? Okay, here are a couple of examples of how we went about analyzing jobs in two different organizations. These examples illustrate the four building blocks we described in this chapter. They also anticipate some aspects of Chapter 9, where we get into the nitty-gritty of actually conducting a job analysis.

EXAMPLE 1: EVALUATION OF AN ELECTRICAL TRANSMISSION AND DISTRIBUTION TRAINING PROGRAM

We were asked to evaluate the effectiveness of a training program used for the lineman job at a medium-sized electric utility company. The training

Table 1.3   Summary of Building Blocks

Descriptor	Method of Data Collection
1. Organization philosophy and structure 2. Licensing and other government-mandated requirements 3. Responsibilities 4. Professional standards 5. Job context 6. Products and services 7. Machines, tools, work aids, and checklists 8. Work performance indicators 9. Personal job demands 10. Elemental motions 11. Worker activities 12. Work activities 13. Worker trait requirements 14. Future changes 15. Critical incidents	1. Observing 2. Interviewing individuals 3. Interviewing groups 4. Technical conferences 5. Questionnaires 6. Diaries 7. Equipment-based methods 8. Reviewing records 9. Reviewing literature 10. Studying equipment design specifications 11. Doing the work
Sources of Job Analysis Data	Units of Analysis
1. Job analyst 2. Job holder's supervisor 3. High-level executive 4. Job holder 5. Technical expert 6. Organizational training specialist 7. Clients or customers 8. Other organizational units 9. Written documents (for example, records, equipment specifications) 10. Previous job analyses	1. Duties 2. Tasks 3. Activities 4. Elemental motions 5. Job dimensions 6. Worker characteristic requirements 7. Scales applied to units of work 8. Scales applied to worker characteristic requirements 9. Qualitative versus quantitative considerations

program offered 242 separate modules, which were part of a multiyear apprenticeship program for these hardy, brave souls who keep the electricity flowing even during stormy and windy conditions. As part of this effort, we wanted to provide evidence of the validity of the program by *showing how the training content compared with job requirements.* This purpose drove

our choice of methods to use. Know your purpose! This is key to all that follows.

Company management hired us. To kick off the project, we met with Transmission and Distribution (T&D) training staff to introduce the project and to find out if they had any issues needing attention. (As an aside for all you future consultants, you depend upon the people in the company to achieve your goals. Win them over up-front by inviting them to be part of the process.) We thought that tasks (see Chapters 2 and 4 for more about tasks) and knowledges, skills, abilities, and other personal characteristics (see Chapters 3 and 4 for more about KSAOs) would be just the thing to focus on. The tasks and KSAOs correspond to the descriptors 12 and 13 in the list shown in "Kinds of Job Data Collected" earlier in the chapter. As an alert reader, you have doubtless anticipated something about the units of analysis to be used as well.

Luckily we had access to a previously compiled list of 385 tasks (for example, install automatic dead-ends on wire) and 34 KSAOs developed after hiring on with the company (for example, ability to rig headlines, slings, and come-alongs). Companies keep this sort of information if they think it will come in handy, and in a training department, it typically does. Check out our list of "Sources of Information," items 9 and 10.

We assembled a group of job experts, including linemen, supervisors, a T&D trainer and a planner analyst. This group had a collective 154 years of experience. If you jump back to our list of sources of information, you may notice that items 2, 4, 5, and 6 apply, though not in that order. We leave the proper ordering and the popping of aspirin as exercises for the reader. Back to our story. We first met the group to explain that we wanted them to review and revise the tasks, KSAOs, and ratings of their relative importance. We gave them complete lists to study and analyze on their own. The group reconvened 3 weeks later, and made changes to ratings of 14 tasks, deleted six, split a few into two, and changed the step in the apprentice progression in which 27 tasks would first be done. Eight KSAOs were re-ranked in importance. You have doubtless noticed that we mentioned having our experts review ratings of tasks and of KSAOs. Check out items 7 and 8 in our list of units of analysis.

We then reviewed the modules against the tasks and found that 359 of 385 (93 percent) were covered by the 242 modules, while 27 of the 34 KSAOs (79 percent) were developed by the training modules. These data were entered into a report and to us represented solid evidence of the content validity of the training. Here we are, back at the original purpose of the study. We hope that you can see some kind of logic to our choices for the project, mainly that what we did seems to be relevant to the purpose and outcome of the study. Let us try another example in which, you, the alert reader, will pick out the purpose of the study, descriptors of job data, methods of data collection, sources of job analysis data, and units of analysis.

EXAMPLE 2: JOB ANALYSIS FOR
DEVELOPING MINIMUM QUALIFICATIONS

Here's another, different example that is all about selection of staff rather than training. As part of a long-running court case on equal employment opportunity, a large hospital delivering mental health services to in-patients and outpatients faced a problem with the minimum qualifications (MQs) it was using to screen people for a large variety of jobs. Minimum qualifications are typically statements of education, training, and work experience that people must have to be considered for a job. An example for a professor would be a PhD degree in some specialty and 2 years of postdoctoral experience. The court case had found some indication that MQs for a bunch of jobs had an adverse effect on the job chances of members of a certain minority group. The court turned to us to establish whether the MQs were valid in screening out those who were not qualified for the jobs they applied for, which would justify the use of these MQs even though they had an adverse effect on job chances of the plaintiffs. We found that there was really no accepted method for developing and validating MQs, and so with the help of staff at the hospital and the state human resources department we invented one that the court accepted. Here's how it works. We will illustrate with one of the jobs from the bunch where the MQs were in question, namely—pharmacy technician (PT).

Of course we held meetings with key staff to kick the project off. We had our purpose specified as developing valid MQs for this job. The original MQs for PT were, "Two years of experience in assisting a registered pharmacist in the compounding and dispensing of prescriptions."

As with our first example, we decided that our stated purpose could be best accomplished by using tasks and KSAs (not O's because O's involve things like personality and you can't tell about personality from a job application), but with a twist. We first developed full lists of tasks and KSAs with the aid of panels of six to nine job experts—one panel for tasks and one for KSAs. But rather than using the full list of tasks and KSAs as a basis for developing and validating MQs, we wanted to split out a smaller number of these that were suited for distinguishing between those who are just barely acceptable for a job and those who are not. This is, after all, what MQs are designed to do. So in a fit of ingenuity (we book authors like to flatter ourselves) we created scales that the experts could use to identify those particular tasks and KSAs. For the tasks, we asked experts to tell us whether even barely acceptable employees should be able to perform the task being rated (Yes or No). For KSAs, we asked experts to tell us whether even barely acceptable employees must possess the level or amount of this KSA to do the job (Yes or No). An example of a task that survived the cut was, "Check patient records to determine drug allergies and interactions." A KSA that made it through was, "Ability to communicate

orally with pharmacists/other health care professionals." Notice that the experts said that even barely acceptable beginning pharmacy techs would have both these qualities.

From this more select list of tasks and KSAs, human resource specialists could do research to find out what kinds of training, education, and work experience would provide the capacity to carry out the tasks or develop the KSAs needed for even a barely acceptable worker. They then formulated what we called "MQ profiles" that another panel of experts rated in terms of whether each of the profiles provided the prospective employee with what is needed to perform at a barely acceptable level on each task and KSA in the select lists. For PT, six different profiles survived this rating process. So now there would be six ways for people to qualify, not just the one way based on the original MQs. Two of the profiles included, "Eighteen months of experience assisting a pharmacist in a *non-hospital* setting. Such duties must include maintaining patient medication records, setting up, packaging and labeling medication doses; and maintaining inventories of drugs and supplies," and, "Completion of a Hospital Pharmacy Technician program accredited by the American Society of Hospital Pharmacists." Clearly the new MQs allow for more ways to qualify, and shorten the time requirements, thus enhancing the job chances of all applicants including those in the plaintiff's group. The findings for PT and numerous other jobs were fully documented in technical reports filed with the court.

Those interested readers who want a more complete version of the MQ example can access the paper by Levine, Maye, Ulm, and Gordon (1997). (This is not to imply that all you readers are not utterly fascinated by this example. We know there are other legitimate demands on your time.) A more recent take on job analysis for MQ development can be found in the paper by Buster, Roth, and Bobko (2005).

Chapter Summary

This chapter has fulfilled four primary goals. First, we have argued that job analysis is important because it forms the basis of solutions to many practical problems. Second, we provided an overview of the book. Third, we offered definitions of several terms used in job analysis, especially the job. Fourth, we presented descriptions of the building blocks of all job analysis methods. Finally we presented a couple of examples of projects that indicate how job analysis helped accomplish important objectives. Now that you have gained familiarity with the basic aspects, you are ready to move ahead with your exploration of the exciting world of job analysis.