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Review and Assessment of Personnel Competencies and Job Description Models and Methods

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Executive Summary

Background

Organizations are looking for effective methods to acquire, manage, and retain a talented workforce to meet organizational goals successfully. To accomplish this objective, some government and private organizations emphasize the need to understand better the personnel and occupational information and data needed to improve the management of human capital. To improve this understanding, some organizations are developing and using competency-based management systems. Specifically, the Department of Defense (DoD) defines a competency as "an (observable) measurable pattern of knowledge, abilities, skills, and other characteristics that individuals need to successfully perform their work" (Department of Defense 2008, 8). However, there is variability in how other organizations define and use competencies for human capital management.

Information regarding job classification and occupational data has a long history. The U.S. Government has collected occupational data since the 1850 census, which included occupational classifications. To understand the country's labor picture, the Department of Labor (DOL) created and maintains several mechanisms, including the Standard Occupational Classification (SOC) system and the Occupational Information Network (O*NET) to standardize occupation information across private and government sectors. To aid in the recruitment and hiring of government personnel, the Office of Personnel Management (OPM) developed the Multipurpose Occupational Systems Analysis Inventory - Close-Ended (MOSAIC), which describes government jobs and promotes a common understanding of the critical elements of each job among human resource (HR) personnel, management, and employees. Academic research on competencies started in the early 1970s in an effort to develop selection methods to predict subsequent job performance more accurately. This line of research on competencies has evolved over the years to include a link between the competencies of individual employees and the organizational mission and strategic goals.

Based on this broad perspective, IDA analyzed how several organizations—selected to represent a breadth of approaches and contexts—use the different forms of competency systems and job descriptions to address human capital management and determine the state of the practice. Through interviews and literature reviews, IDA conducted a thematic analysis to identify common issues relevant to the current state of the practice of using competencies. The assessments included U.S. federal agencies and private organizations, and involved reviewing published documentation and interviewing professionals at the

organizations. This analysis was at the organization level (i.e., linked to an organization's mission and division/department/office substructure and functions) and at the individual/position level (i.e., assessing and evaluating individuals and determining specific position requirements for hiring, assigning, and developing personnel).

Findings

No consistent use of competencies was evident across the organizations studied by IDA. In addition, a variety of reasons for developing competency systems created confusion about what competencies are and about their utility. To help structure these findings, IDA developed a schema about how competencies describing jobs could be a valuable mechanism to manage human capital from a strategic organizational and an individual personnel perspective. To characterize the state of the practice and a way ahead, IDA described and provided examples about the following six issues and proposed research directions for each:

- **Taxonomy.** Dissimilar structures for organizing/classifying and using competencies.

- **Granularity.** Dissimilar levels of detail to describe a specific position, a particular job, or a broader occupation.

- **Validity.** Demonstrating a defensible mapping of competencies to job requirements.

- **Tailoring.** Ability to adapt general competency structures and databases to fit organizational specifics.

- **Credentialing.** Evidence that education and other experience provide individual competencies to match job needs.

- **Automation.** Utility for streamlining the use of competencies.

Obstacles must be overcome in developing a comprehensive competency system that seamlessly functions as the human capital management backbone for an organization to recruit, select, assign, develop, and manage the workforce. However, a system that effectively links the organization's mission to the individual capabilities of the entire workforce is a worthwhile goal. Currently, the organizations that we reviewed only use competency systems for some purposes (e.g., hiring) and not for others (e.g., defining top-down functional needs of management). We did not identify an organization with a comprehensive competency system that spanned all human capital functions (i.e., recruiting, selecting, assigning, developing/training, and managing the workforce). Continued research about ways to develop and employ competencies more effectively and efficiently will expand their uses.

Contents

1.   Introduction and Background

Organizations are always looking for new ways to acquire, manage, and retain the talent needed to reach their goals. To achieve this goal, some government and private organizations emphasize the need to better understand personnel and occupational information and data for improved competency management. Competencies and detailed job descriptions generally are recognized for their value to enhance organizational management. The Department of Defense (DoD) defines a competency as "an (observable) measurable pattern of knowledge, abilities, skills, and other characteristics that individuals need in order to successfully perform their work" (Department of Defense 2008, 8). The terms in DoD's definition are comparable to many others' definitions. However, there is variability in how organizations use competencies for human capital management. What this means and how these terms are applied in practice are inconsistent within job fields and across organizations. This document does not resolve those problems or present arguments about different perspectives that are reviewed extensively elsewhere (see, for example, Cardy and Selvarajan 2006). Instead, it presents exemplars, summaries, and analyses about the diverse use of competencies in the United States. The purpose was to describe the state of the practice from a breadth of organizations—DoD, other governmental agencies, and non-government organizations—to provide an intellectual framework and body of knowledge that can be used to inform the development of competency-based programs and technologies. To that end, this document focuses on the utility of competencies, issues, and research directions.

While competencies and detailed job descriptions are not new to some organizations, there appears to be an increased application across varied human resource (HR) functions (i.e., recruitment, selection, learning and development, performance management, career development and succession planning, and HR planning). To facilitate the development and use of competencies, the Department of Labor (DOL), the Office of Personnel Management (OPM), and the different Services in DoD manage extensive databases that consist of occupations/jobs and the competencies required for these occupations/jobs. However, each of these databases supports different content, structures, and the organizational functions. In addition, organizations are inconsistent in how they use these data. The intent of this document is to describe some competency use cases and illustrate the state of the practice at a few organizations. It identifies and characterizes the kinds of issues/challenges that organizations that wish to employ competencies must confront and proposes research to begin addressing them.

A. Background

Occupational data has a long history in the United States, beginning with the first official collection in the 1850 Census of Population (Levine, Salmon, and Weinberg 1999). One of the differences from today is that the emphasis then was on naming the employing industry instead of classifying the work performed. In addition, only 322 occupations were listed, and their classifications were rudimentary and dated (e.g., *daguerreotypists* = photographers; *salaeratus* = baking soda makers).

More recently, the Standard Occupational Classification (SOC) system, last updated in 2010 but first published in 1980, is the official federal government reference to all jobs for pay or profit in the United States. Currently, it covers 840 different occupations used for categorizing and analyzing occupational data (U.S. Bureau of Labor Statistics 2010a). The SOC is designed to reflect the current occupational structure of the United States for all jobs in the public, private, and military sectors. Its descriptions show different levels of aggregation, occupation titles, and definitions. The government has several occupation-focused databases, and all of these databases reference the SOC but provide different details to support a diversity of uses.

Historically, OPM's vision was to provide a uniform, competency-based common language for Federal agencies to describe jobs consistently and to promote a common understanding of the critical elements of each job among HR personnel, management, and employees.[1] This was the rationale for OPM's Multipurpose Occupational Systems Analysis Inventory - Close-Ended (MOSAIC) competencies approach, which identifies general, crosscutting competencies (e.g., reading, writing, mathematical reasoning, problem solving) that are relevant across broadly defined occupations and job groups. MOSAIC was not designed to determine the specific competencies required for specific positions, but to enable that process to occur more uniformly across the government. The use of common or general competencies allows comparisons across occupations, jobs, and HR functions that range from recruiting to management and planning.

Another reference for job competencies is the Occupational Information Network (O*NET), which was developed by the DOL. The purpose of O*NET was to standardize occupation-specific competency information, with the intent of bringing order to job descriptions across the private and government sectors. The information in O*NET grew out of the Dictionary of Occupational Titles (DOT) that was initially published in 1939 and regularly updated into the 1990s until it evolved into an online resource (Levine, Salmon, and Weinberg 1999). Today, O*NET is the DOL's primary online source for occupational

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[1] The short summary that follows is based primarily on the Rodriguez et al. (2002) article about the history of OPM's integrated human resource practices. The reader interested in more detail should refer to that paper.

information on hundreds of careers. The DOT was a companion to the Occupational Out-look Handbook (OOH), which was intended for use by returning veterans of World War II as a package of simply bound pamphlets that have grown into a career guide covering about 83 percent of jobs in today's U.S. economy. This handbook served two purposes:

- To provide organized details for employment in fields such as industrial production and related occupations; office occupations; services; educational and related occupations; sales; construction; occupations in transportation activities; scientific and technical occupations; mechanics and repairmen; health; social science; social services; and art, design, and communications.

- To provide statistical reports about industries, such as measurements relating to agriculture; mining; construction; manufacturing; transportation; communications and public utilities; wholesale and retail trade; finance, insurance, and real estate; service and miscellaneous industries; and government.

OPM's MOSAIC and DOL's O*NET are the primary comprehensive references currently available to employers and employees as organized and accessible catalogues of jobs and occupations. These resources provide a foundation and function for the development of competency systems and models[2] to manage human capital efficiently by matching employees with organizational needs. These competency models tend to be used as a general guide for organizations, which then refine them for specific purposes and particular positions within their agency. Rodriguez et al. (2002) suggest that one of the strengths of competency models is that they often are linked to the business goals and strategies of an organization. They provide insight into jobs within an organization. In addition, competency models can focus on whole-person assessment and on the potential of what a person can bring to an organization instead of focusing on narrowly defined tasks specific only to a job's requirements.

B. Employing Competencies

David McClelland is credited with launching the competency movement by his publication of "Testing for Competence Rather Than for 'Intelligence'" (1973). McClelland's research suggested that academic aptitude and knowledge content tests alone did not accurately predict job performance or success in life and that other individual characteristics or competencies (e.g., motivation, leadership, and interpersonal skills) can identify high performers. His conceptualization encouraged organizations to incorporate competencies that describe personal attributes into job analysis methodologies and organizational strategic

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[2] Competency models are a set of competencies that together define successful job performance for a particular job.

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planning to attract high-potential employees who can achieve in high-performing organizations. Across competency resources and organizations, there is variation in definitions and what they emphasize. The DoD's definition presented earlier[3] differs from other definitions. The OPM definition adds how to successfully perform work roles or occupational functions. DOL's definition highlights the successful performance of "critical work functions" in a defined work setting. A broader academic definition refers to a set of observable/measurable knowledge, skills, abilities, attitudes, and other characteristics of the individual that also emphasize a link to the organization's strategic goals (Sanchez and Levine 2009; Campion et al. 2011). Each of these competency definitions, while compatible, has a different emphasis in its implementation.

The employment of competencies by an organization requires a human-intensive workload that includes extensive job analysis and organizational details (Mansfield 1996; Gangani, McLean, and Braden 2006; Campion et al. 2011). An organization first must assess itself as a whole, including the environment in which it operates (Cardy and Selvarajan 2006). This organizational assessment includes aspects such as industry dynamics (e.g., how quickly the industry is changing and the new products or business models that evolve) and industry workforce trends (e.g., how quickly particular skills become obsolete, the surplus/shortage of skilled workers). To develop and implement a competency-based HR development strategy requires considerable effort for developing policy, processes, and tools to support the full and effective implementation of competency-based management (Human Resources Systems Group 2012). The process begins top-down and then works toward specific jobs and how incumbents conduct these jobs. It also has some level of verification or validation that the competency model does represent what leads to success.

The Human Resource Systems Group (2012) provides a set of best practices for implementing a full and effective competency-based management system. It includes guidance on developing a comprehensive system to accomplish different functions, such as recruitment and selection, learning and development, performance management, career development/succession management, and strategic HR planning. A key concept is that competencies in an organization are structured in multiple layers, beginning with a bottom/general layer that includes core competencies that all employees should possess (e.g., teamwork). There are also common competencies that cluster for a group of jobs (e.g., project management) and technical/professional competencies within that group. The top layer is leadership for managing, supervising, or influencing the work of others, which, of course, can also be required at other layers. Accompanying that structure are proficiency

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[3] The DoD defines competency as "an (observable) measurable pattern of knowledge, abilities, skills, and other characteristics that individuals need in order to successfully perform their work" (Department of Defense 2008, 8).

levels and scales (e.g., entry, fully effective, mastery) to assess how well employees are doing and what development/advancement is appropriate.

The DOL has promoted the use of competencies through the Competency Model Clearinghouse (U.S. Department of Labor 2016b). The Clearinghouse employs a multi-tier template for competency models that is similar to the structure outlined in the Human Resource Systems Group (2012), which is explained in more detail in Chapter 4 of this document. The current competency models in the Clearinghouse are industry-specific and demonstrate how a meta-organizational understanding, such as an industry-wide perspective, is useful for developing a competency system. Many models in the Clearinghouse were developed by industry associations in collaboration with DOL's Employment and Training Administration.

The hard work is in the details of implementing a competency-based system (Shippman et al. 2000; Sanchez and Levine 2009). Users face a number of difficult questions: Should we create our own competencies or begin with an existing set? What competency layers or hierarchical structure should be used, and how? What are the standards and procedures for using competencies for their different purposes? For example, competency use for recruitment and selection should begin with fair and validated standards and measures for a specific job, including behaviors and skills. These standards and measures also should link to criteria for on-the-job performance to allow an evaluation of success. The process should be efficient, with reusable components (e.g., templates for interviews, feedback criteria for participants, and records to help with future learning and development decisions). Satisfying the purposes of developing a competency system requires well-developed practices, which, at some of the organizations we reviewed, seem to be a work in progress.

2.   Method and Approach

The research process for this project involved identifying organizations that were willing to share how they use competencies, collecting information relevant to the topic through interviews and literature reviews, and analyzing how the different organizations used competencies for human capital management.

A.   Participating Organizations

Three kinds of organizations were selected for this review of the state-of-the-practice of competencies. They included (1) components within DoD that employ military or civilians, (2) other government organizations that are not DoD, and (3) non-government organizations, including private companies. The organizations were identified through Internet searches using key words such as competencies, job description, human capital management, and related variants. A list of organizations was compiled from the candidates so that there were at least five DoD organizations, two other government organizations, and two non-government organizations.[4]

B.   Information Collection

Individuals at candidate organizations were contacted through email, phone, or in person at organizations identified in the search described previously. A typical request to a potential interviewee included a brief description of the project's goals and purpose as follows:

> The Institute for Defense Analyses (IDA) is studying the personnel practices at a variety of organizations: military, government, and non-government. We're particularly interested in the state of the practice of using competencies at your organization. For example, when you want to hire someone, do you have a previously prepared list of jobs and qualifications for those jobs or do you get together and decide case-by-case? Similarly, we'd like to discuss your approaches to employee development and performance evaluation. The result of our project will be a description of the state of the practice for using competencies and identification of common issues across organizations.

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[4]   Some of the organizations are not identified by name for two reasons: many wanted anonymity in exchange for candor, and IDA's interest was only in trends and summaries of the state of the practice. All of the organizations that are named have published some information regarding use of competencies, indicating a willingness to share their information publically.

Interviews were with person(s) who were knowledgeable in their organization's use of competencies. Semi-structured interviews, which usually lasted about an hour, included specific questions about hiring, employee development, performance evaluation, and a competencies framework for the organization. Follow-up questions were used to gain additional detail. IDA also requested supporting or supplementary documents from each organization that it contacted.

C. Analyses

The analyses consisted of two components: functional analysis of individual organization's competency uses and thematic analysis of common issues across organizations. The purpose of the functional analysis was to assess the organizational processes using competencies, and this assessment led to development of a schema that characterizes the many ways that competencies could be used within organizations. The analysis categorized what was said in interviews, which was verified, when possible, from documentation provided by the organization. The purpose of the thematic analysis was to identify common issues across various organizations. IDA compiled comments and complaints about implementing and using competency systems and procedures while noting recurring themes, as reported in Chapter 4.

Overall, the analyses provided an integrated perspective and interpretation from people who have worked with or implemented varying types of competency systems and applications. The functional analysis and additional research literature provided background and context for IDA's findings reported in Chapter 3.

3. Developing a Schema

To examine how competencies are used by organizations, IDA developed a generalized schema that depicts how organizations *could* use them. Then, we compared aspects of what was being done with the schema based on discussions with organizations that employ competencies and on reviews of published literature. The schema was updated as the project progressed.

Competency systems serve three major purposes: (1) for organizations/employers to satisfy their human capital management needs, (2) for employees to understand current job requirements and those of positions for which they may be interested in applying in the future, and (3) for organizations and employees to use in learning and development contexts. Organizations/employers want a competent and relevant workforce that has the necessary knowledge, skills, and attributes for the jobs, which includes having the right jobs and responsibilities identified for each organizational level. Organizations want a system that guides them to make well-informed human capital management decisions—having the right people in the right positions at the right time. In turn, employees seek relevant and rewarding positions, beginning with job announcements that describe their responsibilities and performance requirements clearly. Employees also want to know about training, development, and career progression pathways. The ideal competency system should satisfy the organizational and the individual needs and follow a schema like the one described below.

The potential benefit that an organization can gain from developing a competency system is at two levels that translate into sets of functions depicted in Figure 1:

- **Organization level.** Formal procedures that identify the organization's mission, strategic goals, and objectives as a higher level perspective for the application of job/position competencies necessary for successful performance of the organization. This level includes a clear description of the organization-wide outcomes that define success and the division/department/office substructure and functions to achieve it.

- **Individual and position level.** Criteria for assessing and evaluating individual jobs/positions and to determine specific position requirements for hiring, assigning, and developing personnel. This level is the level where competencies would be mapped or allocated to specific positions so that it would be clear how many people (positions) would share the competencies.
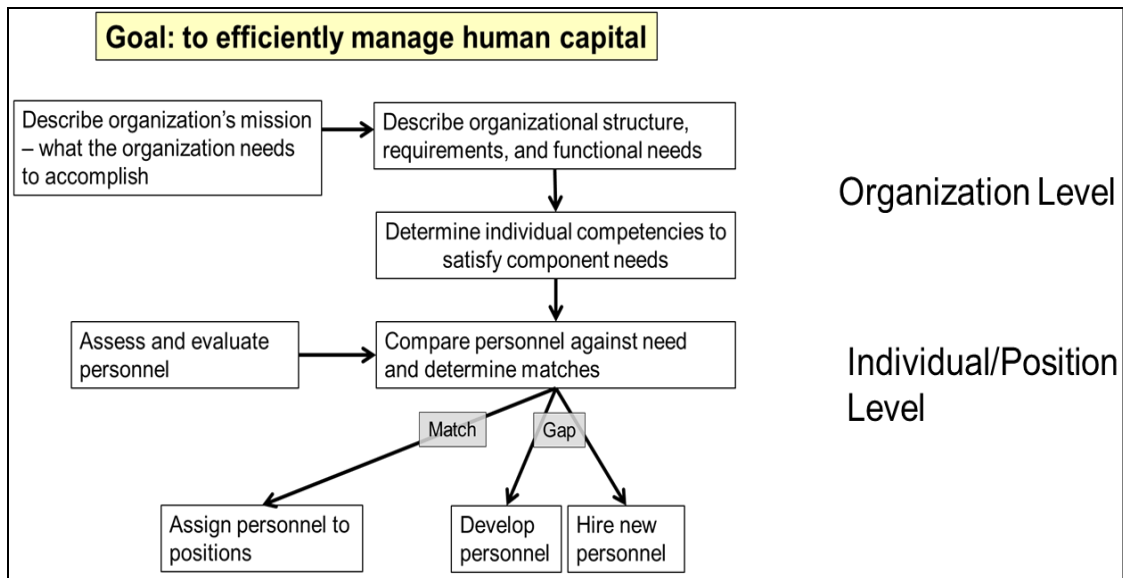
Figure 1. Process Schema for Organizations Using Competencies

IDA's development of the competency schema was informed by information from published literature and from practitioners interviewed during the project. The practitioners included organizations selected to represent a range of approaches toward competencies. The use of competencies by practitioners was reviewed at the organizational level for their link to the stated mission, vision, and strategic perspective and at the individual position level for their focus on hiring, assigning, assessing, and developing personnel. The details for the organizational and the individual levels varied across practitioners.

At the organizational level, IDA assessed whether competencies were integrated into management's strategic perspective toward planning and operations. This perspective could involve links of the organization's mission and goals with their higher level functional needs and organizational structure. It also could include strategic forecasting to determine future functions and capabilities that the organization should develop. The existence or development of a competency-based personnel database to support strategic human capital decisions is an example of competency use at the organizational level. The systematic development of competency models demonstrated the importance of the systematic use of competencies in the organization.

At the individual level, IDA assessed the organization's process for developing specific competencies for individual positions or job classifications. A meaningful process included using job/task analysis methods and techniques for identifying/determining knowledge, skills, abilities, and other personal characteristics (e.g., motivation, attention to detail, openness to new experiences) that are indicative of strong performance in a position. A meaningful process also addressed a range of individual functions, such as recruitment, selection, assignment, employee evaluation, and personnel development.

4.   Issues

A few consistent themes emerged from the reviews of how different organizations use competencies. Six issues were identified, along with capabilities and limitations based on current state of the practice at selected organizations. The examples described in this section include organizations that we interviewed along with some organizations described through published literature. This review included a few Federal offices and agencies, such as components of DoD, the Department of State, DOL, and OPM, along with some private organizations. Organizations that were reluctant to be identified publically were not used as examples but provided background information and confirmed much of what others said. In addition, each issue and the evidence for it suggest prime research/development needs for advancing the use of competencies. The issues defined below, including research propositions, are addressed in Sections 4.A–4.F:

- **Taxonomy.** Dissimilar structures for organizing/classifying and using competencies.

- **Granularity.** Dissimilar levels of detail to describe a specific position, a particular job, or a broader occupation.

- **Validity.** Demonstrating a defensible mapping of competencies to job requirements.

- **Tailoring.** Ability to adapt general competency structures and databases to fit organizational specifics.

- **Credentialing.** Evidence that education and other experience provide individual competencies to match job needs.

- **Automation.** Utility for streamlining the use of competencies.

A. Taxonomy

Across organizations, diverse taxonomies (i.e., nomenclature, classification, and organized structure for a domain or field) were used to describe competencies. Some taxonomies, for example, focused on detailed tasks and specific actions that a job incumbent needs to perform, while others emphasized broader personal characteristics, attitudes, and traits. Such differences from one organization to another make comparing competency taxonomies difficult. The development of methods to crosswalk taxonomies could broaden their use by encompassing the variety of terms and functions

1. Examples of Varied Taxonomies

Today, competency systems serve different purposes for the taxonomies that organizations develop. For example, some systems, such as OPM's MOSAIC, focus primarily on hiring functions, which outline competencies desired in a job applicant. Other systems describe existing workforce capabilities as in the Army's military occupational specialties (MOSs), where every person in a particular specialty is expected to be competent at his or her job requirements. The DOL developed O*NET to standardize the descriptions of occupations and provide relevant workforce information to employers and the workforce in an effort to understand the current labor force and relevant context.

DOL's Bureau of Labor Statistics has attempted to link occupations across these competency systems (U.S. Department of Labor, n.d.). This crosswalk relies on the SOC, which provides a central umbrella system for everyone as the official U.S. Government classification system for occupations. However, the SOC does not provide much detail about specific job functions and skills. For example, the SOC defines the job functions of Computer and Information Systems Managers (SOC 11-3021) as "Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming" (O*NET Online 2016). However, it does not describe specific types of data processing, system analysis, or computer programming that might be required.

Other large and comprehensive systems like O*NET and MOSAIC provide more detail. Table 1 shows some of the comparable occupational information for an Information Technology Project Manager (O*NET) and Information Technology Management (MOSAIC) for the two different taxonomies. The rows of the table are based on O*NET's data structure because MOSAIC does not differentiate among the data categories. These categories include a range of knowledge, skills tasks, tools, personal characteristics and other information. Some of the information in O*NET for a particular occupation is unique to that occupation, while other components are similar across occupations. OPM's MOSAIC uses a set of 300+ standardized competency descriptors for an occupation. It should be noted that O*NET and MOSAIC do not even have the same job/occupation titles to facilitate a crosswalk between the two systems. Both O*NET and MOSAIC descriptions are more detailed than what the table shows, but the breadth of information is representative of differences between these two competency systems.

Table 1. A Comparison of Competency Information in O*NET and MOSAIC Databases

O*NET Categories	O*NET Example: Information Technology Project Manager	MOSAIC Example: Information Technology Management (GS Series 2210)
Occupation-specific tasks	• Manage project execution: budget, schedule, and scope • Develop/manage work breakdown structure of information technology (IT) projects	• Systems life-cycle management to plan, develop, implement, operate, and maintain information systems
Tools and technology	• Computer servers: application servers, Web servers • High-capacity removable media drives	
Necessary knowledge	• Business and management principles • Principles and processes for providing customer and personal services • Circuit boards, processors, computer hardware, and software	• Principles/methods for coordinated management of an IT program • Principles/methods for planning/ integrating IT systems • Principles/tools of data management (e.g., data mining, backup, recovery)
Skills	• Critical thinking and coordination: coordinating and adjusting actions in relation to others' actions	• Customer service
Relevant personal abilities, interests, and values	• Oral Comprehension: listen/understand information (spoken words, sentences) • Enterprising: initiating/completing projects, leading people, making decisions, risk taking, and business abilities • Achievement: results oriented	• Attention to detail • Oral communication • Listens to others and attends to non-verbal cues
Activities	• Organizing, planning, and prioritizing • Analyze data to identify trends or relationships • Manage IT projects or system activities	• Problem solving: identify problems, determine accuracy and relevance of information, use sound judgment to generate/ evaluate alternatives
Expected training, experience, and licensing	• Most of these occupations require a 4-year bachelor's degree, but some do not • Employees in these occupations usually need several years of work-related experience, on-the-job training, and/or certification	

There is a categorical difference in types of competencies across the two systems and how they are organized. In O*NET, the categories provide a logical structure of the information, with some focus on task or skill details of the specific occupation and additional information on general personnel characteristics that would be desirable. For each O*NET category, the expectation is that the information included provides a broad spectrum understanding of the occupation. In OPM's MOSAIC, both detailed (e.g., data management) and general (e.g., attention to detail) competencies are provided, but no identified

structure differentiates the types. Therefore, with MOSAIC, some categories of information may be included for one occupation and not for others. Further, it may be unclear whether the competency represents a skill that a person must be able to perform or only a skill about which the person must be knowledgeable. With systems that lack categorical consistency, it is difficult to make comparisons across occupations and systems.

2.   Examples of Military vs. Civilian Taxonomies

One situation in which the differences in taxonomies are highlighted is between standard military and civilian taxonomies for describing positions. For example, DoD has a set of standards for the physical abilities profile for particular positions called PULHES ratings.[5] In addition, there is a requirement for a particular level of cognitive performance on the Armed Services Vocational Aptitude Battery (ASVAB), which is used for selection and assignment to job categories. In contrast, factors such as physical ability ratings or vocational aptitude are not commonly used to select and assign personnel for civilian positions.

Even if PULHES and ASVAB scores were removed from the comparison, there would still be differences between military and civilian competency systems that can be confusing. For instance, different jargon is used to describe job requirements and the context in which the job is performed (e.g., military operations in a combat zone vs. an office setting). This use of different jargon can lead to difficulties for Service members and veterans trying to identify jobs in the civilian workforce that are comparable to their military expertise. Congress approved a Public Law to assist the translation between military and civilian taxonomies. Section 222 of Public Law 112-56 (VOW to Hire Heroes 2011) requires the Secretary of Labor, in consultation with the Secretaries of Defense and Veterans Affairs, to study the equivalencies between military and civilian occupations in an effort to facilitate the transition of military personnel to the civilian workforce. Military-civilian equivalencies are the subject of continuing efforts by DOL, OPM, and the Services and require extensive human analysis by individuals knowledgeable about both systems.

On the O*NET website, there is a Military Crosswalk (O*NET Online, n.d.), where an MOS can be inserted and a listing of similar civilian links is provided. For example, if Information Technology Specialist (Army - 25B) is selected, O*NET provides links to Computer and Information Systems Managers, Information Security Analysts, Network and Computer Systems Administrators, Computer User Support Specialists, Computer Network Support Specialists, Information Technology Project Managers, and Computer Operators. While these links allow a Service member to explore potential civilian job titles,

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[5]   In this rating system, "P" stands for "Physical capacity or stamina," "U" stands for "Upper extremities," "L" stands for "Lower extremities," "H" stands for "Hearing and ears," "E" stands for "Eyes," and "S" stands for "Psychiatric."

an employer may not be aware of or take the time to go to the website to see similarities that would be informative while reviewing résumés from military Service members. The existing systems make the comparisons at the job classification or job title level—not at a level that describes specific knowledge, skills, abilities, and other characteristics that individuals need to successfully perform their work, as in the DoD definition of competencies (Department of Defense 2008). A system that goes beyond matching job titles and allows for the comparison of competencies or clusters of competencies would provide a more detailed crosswalk.

3.   Research Proposition – Taxonomy

To address the issue of taxonomy crosswalks, a means of translating from one to another is needed. Current efforts to crosswalk taxonomies do not address the differences in their underlying structures, but, instead, only link a job title in one taxonomy with a job title in a different taxonomy. It may be possible to develop a crosswalk system that incorporates existing taxonomies as a foundation but addresses their fundamental differences. The first step might be to determine a base set of the taxonomy categories for some level of compatibility. Table 2 provides a description of four different competency categories that could be used as a foundation.

Table 2. Competency Categories

Category	Description
Knowledge	Understanding facts and information of a topic or subject area
Skills	Proficiency at specific tasks (e.g., assemble a rifle, perform a statistical test)
Ability	General capability (e.g., cognitive ability, manual dexterity, stamina)
Other characteristics	Personal qualities that an individual exhibits (e.g., motivation, positive attitude, inquisitiveness)

A general taxonomy for competencies would require such an organization of competencies by categories as a foundation. It acknowledges that there are fundamental differences between the categories that need to be accounted for when comparing across organizations. If the set of competency categories in Table 2 were acceptable, the additional efforts should include standardized metrics for each category, definitions of the relationship between types for varied purposes (e.g., selection, assignment, and training) and their verification and validation, and the steps necessary for organizations to apply the competency categories to their existing systems. Such a categorization system of competencies would provide an organizing structure that could better accommodate varied organizations and human capital management purposes.

B. Granularity

There is inconsistency in the levels of detail described by competencies across and within organizations. Some organizations stress detailed competencies that describe specific actions/tasks that are highly contextually dependent (e.g., analyze product sales data across store locations using MS Excel) or could be applied to just a few positions. Other organizations tend toward general competencies expected for all/most employees (e.g., communicate clearly) or considered standard workplace skills (e.g., attention to detail). In addition, general and specific competencies are used without differentiating their level of breadth/detail.

There is no clearly right/wrong level of detail in competencies, and different levels may be optimal for different uses. An organization may use specific competencies as a good foundation to build detailed learning objectives and training goals for personnel development, including what is needed for successful trainee outcomes. More general competencies may be better for occupational classification and managing a large workforce in which many individuals have similar job requirements. However, variation in detail in competencies makes comparisons and transfer of their use across organizations a challenge.

The difference in competency breadth/detail sometimes is hierarchical. To illustrate, a broader competency, such as communication, can be broken down into written, verbal, and listening skills. Or, the nature of the difference in breadth/detail can be due to context such as with "leadership," where differences across situations (e.g., leadership of IT professionals *vs.* leadership of an infantry battalion) are expected and essential. The following examples show the disparities in competency breadth/detail (granularity) and hierarchy for a few organizations.

1. Example – DOL Clearinghouse Model

The Competency Model Clearinghouse (U.S. Department of Labor 2016b) is a collaborative effort by DOL and industry to develop descriptions of what a person needs to know and be able to perform well in a specific job, occupation, or industry. Industry-wide models describe successful performance in a defined work setting (i.e., industry specific) and include many different occupations in that industry. The Clearinghouse is a repository for the industry competency models and provides a guide for developing new models. Each of the existing models in the repository includes occupation-specific links to O*NET. Industry associations, labor organizations, educators, and other subject matter experts (SMEs) validate (i.e., content validity) and maintain/update the models in the repository. Such industry-wide perspectives are useful for competency system development.

The model framework consists of nine tiers, segmented into three groupings, as shown in Figure 2. The base group is called Foundational Competencies and consists of Tier 1 (personal effectiveness competencies such as integrity, professionalism, and willingness to learn); Tier 2 (academic competencies such as reading, writing, mathematics); and Tier 3 (workplace competencies such as teamwork, customer focus, and problem solving). The next level comprises industry-related competencies, which include Tier 4 (industry-wide competencies) and Tier 5 (industry-sector competencies that are more specific than Tier 4). The top four tiers are occupation-related competencies (e.g., Tiers 6–8 are occupation-specific knowledge, technical information and requirements that are part of O*NET). However, when looking at the specific occupations in O*NET, there is no clear acknowledgement that the same occupation in different industries (e.g., accountants at a financial services firm, accountants at a manufacturing company, accountants at a university) would have differences in the Tier 6–8 competencies. Tier 9 is the top tier and includes competencies for managing the occupations within the particular model. This hierarchical structure allows the framework to include general competencies that most good workers should possess, more specific competencies that would be common within a particular industry, and specific competencies that are relevant to particular occupations.

Occupation-Related Competencies
- Tier 9 – Management
- Tier 8 – Occupation-specific requirements
- Tier 7 – Occupation-specific technical
- Tier 6 – Occupation-specific knowledge

Industry-Related Competencies
- Tier 5 – Industry-sector technical
- Tier 4 – Industry-wide technical

Foundational Competencies
- Tier 3 – Workplace
- Tier 2 – Academic
- Tier 1 – Personal effectiveness

Source: U.S. Department of Labor (2016c).

Figure 2. The Framework Used for DOL's Competency Model Clearinghouse

The different levels of competencies addressed in this framework require model builders to determine which ones for a particular job are foundational, industry related, or occupation specific. For example, if a competency were foundational (Tiers 1–3), a training program or evaluation metric related to that competency could be used for all employees. However, if the competency were in Tiers 6–9, the training or evaluation metric should only be applied to people who share the same occupation within the industry. Such an
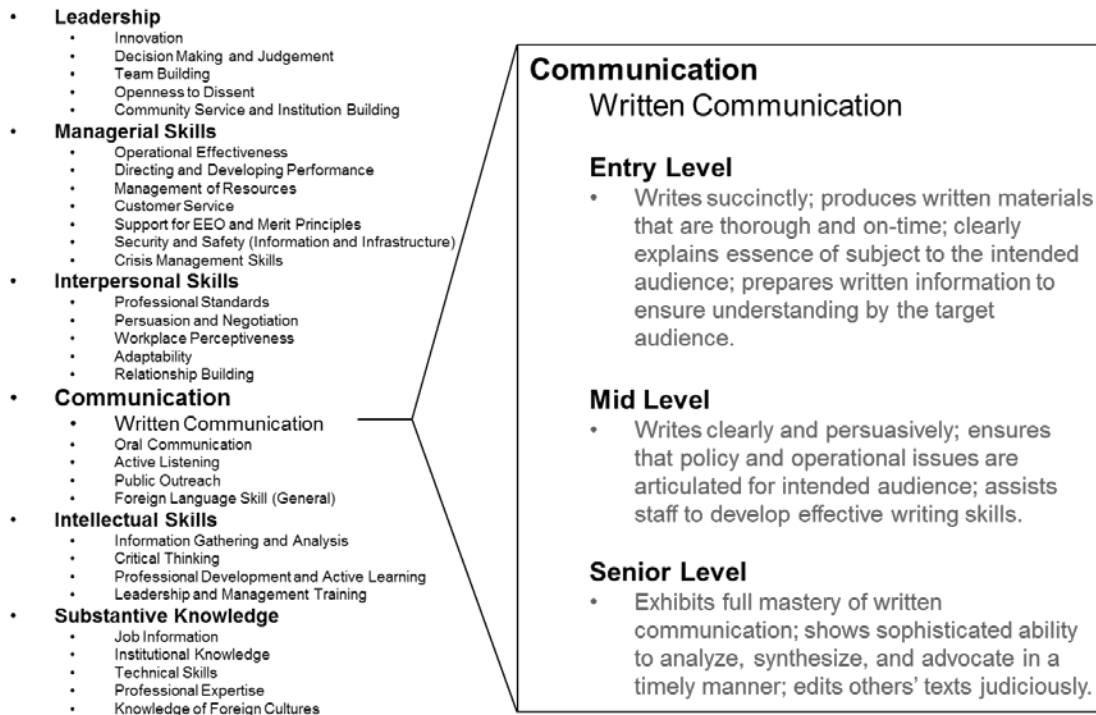
understanding enables the appropriate application of resources depending on the level of competency being addressed.

As an example of the information that would be in the Clearinghouse, the competency model for the IT industry includes information on general positions in the industry, with the expectation that additional specifications would be needed for particular positions in a company. The full model can be accessed at U.S. Department of Labor (2016d). In brief, for Tier 1, the personal effectiveness competencies include interpersonal skills and teamwork, integrity, professionalism, initiative, adaptability and flexibility, dependability and reliability, and lifelong learning. For Tier 2, the academic competencies include reading, writing, mathematics, science, communication, critical and analytical thinking, and fundamental IT user skills. For Tier 3, the workplace competencies include teamwork, planning and organizing, innovative thinking, problem solving and decision making, working with tools and technology, and business fundamentals. For Tier 4, the industry-wide technical competencies include principles of IT; databases and applications; networks, telecommunication, wireless, and mobility; software development and management; user and customer support; digital media and visualization; compliance; and risk management, security, and information assurance. There are no stated competencies for Tier 5 (i.e., Industry-Sector Technical Competencies) and for Tiers 6–9 there is a hyperlink to O*NET that shows a long listing of all occupations that are employed in the IT industry.

2.   Example – Multiple Levels of Competencies at State Department

The State Department has developed a set of precepts for Foreign Service officers that are structured in a unique hierarchical framework (State Department 2014). The precepts are a collection of competencies defined as knowledge, skills, and abilities that have been identified as essential to a successful Foreign Service career (State Department 2012). They are observable behaviors that the best employees exhibit in accomplishing their jobs, getting results, and achieving goals and objectives. The six high-level precepts are leadership, managerial skills, interpersonal skills, communication, intellectual skills, and substantive knowledge. As shown in Figure 3, each of the high-level precepts is broken down into 4 to 7 general knowledge, skills, and abilities (KSAs), which are further broken down by three levels (entry, mid, senior).

The precepts address needs from a high-level, strategic perspective and include themes from the Quadrennial Diplomacy and Development Review (QDDR). This high-level perspective should allow the State Department to address workforce needs as its mission evolves over time and it objectives change. Because the precepts can be broken down into detailed levels, they also are used to develop curricula and training objectives at the Foreign Service Institute. In addition, because the hierarchy includes what an entry/mid/senior level professional should be capable of, the system can be used for evaluating and promoting individuals across a career life cycle.

- **Leadership**
    - Innovation
    - Decision Making and Judgement
    - Team Building
    - Openness to Dissent
    - Community Service and Institution Building
- **Managerial Skills**
    - Operational Effectiveness
    - Directing and Developing Performance
    - Management of Resources
    - Customer Service
    - Support for EEO and Merit Principles
    - Security and Safety (Information and Infrastructure)
    - Crisis Management Skills
- **Interpersonal Skills**
    - Professional Standards
    - Persuasion and Negotiation
    - Workplace Perceptiveness
    - Adaptability
    - Relationship Building
- **Communication**
    - Written Communication
    - Oral Communication
    - Active Listening
    - Public Outreach
    - Foreign Language Skill (General)
- **Intellectual Skills**
    - Information Gathering and Analysis
    - Critical Thinking
    - Professional Development and Active Learning
    - Leadership and Management Training
- **Substantive Knowledge**
    - Job Information
    - Institutional Knowledge
    - Technical Skills
    - Professional Expertise
    - Knowledge of Foreign Cultures

Communication
Written Communication

Entry Level
- Writes succinctly; produces written materials that are thorough and on-time; clearly explains essence of subject to the intended audience; prepares written information to ensure understanding by the target audience.

Mid Level
- Writes clearly and persuasively; ensures that policy and operational issues are articulated for intended audience; assists staff to develop effective writing skills.

Senior Level
- Exhibits full mastery of written communication; shows sophisticated ability to analyze, synthesize, and advocate in a timely manner; edits others' texts judiciously.

Source: Adapted from information in State Department (2012).

Figure 3. Breakdown of State Department Precepts into More Detailed Levels

Note for Figure 3: This figure depicts how the State Department's precepts are broken down to more detailed levels with descriptions of level, with a fine-grained perspective.

3.   Example – DoD

To determine the readiness of the nation's military force to complete its mission requirements, DoD relies on the Defense Readiness Reporting System (DRRS) (Trunkey 2013; Department of Defense 2015). DRRS is a management and reporting system that embodies Mission Essential Task Lists (METLs)—activities that the unit has to accomplish to perform successfully. The METLs can be considered competencies for a unit and are an example of an organizational-level structure because they directly relate to the organization's mission. DRRS provides a strategic perspective on the units from the Army, Navy, Air Force, and Marines and their status of readiness for conducting the missions that they are asked to complete. Thus, DRRS and its component METLs represent a sort of competency management system for military units.

While DRRS currently provides a clear strategic-level view of military capabilities, there is no direct linkage between METLs for the unit and individual competencies for the Service members in those units. For individual competencies, Service members are rated on their ability to perform their jobs as described by their respective military occupational

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codes (MOCs).[6] Within DoD, the strategic-level perspective of DRRS is not directly associated with the individual (e.g., manpower assignment and individual training). Exploring a method to link individual competencies and METLs would be beneficial to DoD's readiness system. For example, a unit rated as "not ready" may have only a few key positions within its ranks that need improvement, which could be revealed by an individual competency analysis, or the unit may be grossly understaffed when readiness is reported and would require months to achieve readiness. Conversely, an individual competency analysis could show that a unit has an overabundance of some skill sets to share with other units, providing a strategy for more "ready" ratings.

4. Research Proposition – Granularity

Currently, there is not a common standard for describing the level of a competency granularity (e.g., broad/general or detailed/specific). This lack of a common standard makes comparisons and transfers of competencies across organizations a challenge. A study of methods to identify levels of granularity in competency systems would help organizations select what suits a specific need. This study could include methods to nest different levels of competencies in a hierarchical system and what constitutes best practices for what purpose (e.g., describe organizational structure/needs vs. individual promotion criteria). Specifically, for DoD, an exploration of a method to roll-up individual competencies to METLs under DRRS would allow a deeper understanding of unit readiness and what personnel matters are influencing the unit's readiness level.

From a training/educational perspective, granularity could be addressed through a stated level of the specificity of the competency. For example, is the competency representative of what would be trained/educated over a multi-week course or would it require just a few hours? Also, what level of learning tools and resources would be required to create appropriate training (e.g., a live fire artillery range vs. a textbook)? For competency-based education, where the Carnegie credit-hour system would not be used, the analogy to a book might be helpful (i.e., is the competency the entire book or just a chapter?). Educational institutions that teach students to qualify for work in a particular industry or company would benefit from a standardization of levels of competency granularity to provide a clearer understanding of what a competency represents (Lacey and Murray 2015).

C. Validity

The matching of competencies to job requirements for personnel selection and hiring needs to be supported by a defensible methodology which, ideally, can stand up to legal scrutiny. For personnel selection, the Uniform Guidelines on Selection Procedures (Code

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6 Section 3.D has a military Service example that describes more about MOCs.

of Federal Regulations (CFR) 2011) requires the use of validity studies including criterion, content, or construct validity:

- **Criterion Validity.** The focus of criterion validity is on forecasting job success. It provides data demonstrating that the selection procedure is predictive of or significantly correlated with job performance.

- **Content Validity.** The focus of content validity is on the substance of the job. It provides data showing that the content of the selection procedure is representative of important aspects of performance on the job for which the candidates are to be evaluated.

- **Construct Validity.** The focus of construct validity is on measuring the candidate's suitability for the job based on relevant concepts that are associated with successful job performance. It provides data showing that the selection procedure measures the degree to which candidates have identifiable characteristics and capabilities that have been determined to be important for successful performance in the job.

Each of the types of validity provide differing evidence that selection procedures are fair and appropriate. Their purpose and the broader purpose of the Federal Guidelines are to provide a set of principles to assist employers, labor organizations, and licensing/certification boards to comply with Federal law prohibiting employment practices that may be discriminatory.

A standard approach to building a valid competency model starts with job analysis to identify critical tasks and capabilities that a person should demonstrate to be successful (Mansfield 1996). This job analysis may include a focus group of jobholders and/or their managers and observations of jobholders. It also may include interviews with customers or other people who are knowledgeable about the job or information from job reports. Next, the information is organized into a competency model that typically includes several competencies that have clear, measurable definitions. The most common validation method used is content validity. For an example of how content validity is regularly assessed, see Tett et al. (2000), where they describe the process for developing and validating the content of managerial competencies. Their validation process was more involved than what most organizations would conduct. However, it was based only on the consistency of opinion ratings by Academy of Management members who were well informed about managerial positions. The consistency of opinion for those competencies was high, but there were no comparisons of competency scores to job performance ratings to assess criterion validity.

The goal of criterion validity is to determine quantifiably whether the set of competencies is predictive of success or competence in a position. When measures of theoretical constructs are validated empirically to predict job performance, both criterion and construct

validity can be simultaneously demonstrated. As a practice, empirically demonstrating criterion validity is not as common as demonstrating content validity for competency system development. However, for personnel selection and hiring measures that can stand up to legal scrutiny, criterion validity is more robust than content validity (Gilliland 1993). It provides a level of confidence that the data used to inform these decisions are appropriate since empirical and statistically valid measures were used to predict job performance. An organization must justify its job requirements with explicit competency profiles that should be associated with outcomes that link to job performance, and criterion validity provides an empirical demonstration of such a link.

1.   Examples of Determining Criterion Validity

Multiple empirical studies have been conducted to assess the validity of job selection criterion (Schmidt and Hunter 1998; Roth, Bobko, and McFarland 2005; Knapp and Heffner 2010). Making job-selection decisions based on competencies assumes that the competencies listed on a résumé, demonstrated to an educational/training institution, or demonstrated through a selection test will predict an applicant's future performance in the actual work setting. The primary statistical method for determining validity is a correlation between a predictor measure and a criterion of subsequent performance (i.e., basically, how well does the predictor measure correlate with the performance criterion?).[7] One of the earlier meta-analyses on job selection measures (Hunter and Hunter 1984) studied specific predictor measures. They found job performance was predicted by work sample tests ($r = .54$), general ability measures ($r = .53$), and job knowledge tests ($r = .48$). One method to increase the predictive strength is by using multiple measures that provide an indication of who is more likely to succeed. Roth, Bobko, and McFarland (2005) conducted a meta-analysis of instances where both general cognitive ability and work sample tests were used, and they found, using multiple factor regression, that cognitive ability was predictive of job performance ($r = .39$) and that the addition of work sample ratings improved the predictive strength to $r = .45$.

Jobs are multifaceted so that performance can be assessed many different ways, such as job knowledge, ratings from peers, physical capabilities, and safety/discipline reports. A robust predictive measure should adequately predict multiple aspects of on-the-job performance. The U.S. Army has conducted extensive research on the use of different

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[7]   A correlation is a statistical measure of the relationship between two variables, with values of a correlation coefficient expressed as "r =" and range from -1.0 to 1.0. If $r = -1.0$, it indicates an extreme inverse relationship: that as one value increases, the other always decreases. If $r = 0.0$, it indicates no relationship between the variables. The variables fluctuate independently of each other. If $r = 1.0$, it indicates that as one variable increases, the other always increases. There is no specific cut-off value that indicates that a correlation is strong/weak, but, for selection measures, an $r > .20$ is considered useful.

measures taken during recruitment as a means to identify who is more likely to be a successful Soldier. The Armed Forces Qualification Test (AFQT) is a cognitive test that has a well-supported ability to provide some predictive strength for identifying who may be successful during initial training. Non-cognitive tests (e.g., Tailored Adaptive Personality Assessment System (TAPAS)) supplement the AFQT's predictive power by using measures of temperament characteristics, such as dominance, attention-seeking, intellectual efficiency, physical conditioning (Knapp and Heffner 2010, 8). Table 3 shows the relative strengths of the two predictors: AFQT by itself and the combination of AFQT and TAPAS. The criterion for the validity studies are how well those measures relate to categorical competencies, such as demonstration of job knowledge and physical ability along with other personal characteristics such as effort and discipline. For some measures, one of the predictors by itself may not be very strong, but the other helps improve combined test utility, demonstrating how multiple measures can improve prediction strength. The line of research described in Knapp and Heffner (2010) also shows that there are multiple useful indicators of how well a person performs his or her job (e.g., job knowledge, the effort put forth, physical capabilities, and adherence to rules).

Table 3. Correlation of Selection Criteria
(AFQT and TAPAS) for Multiple Measures of Soldier Fitness and Competence

Criterion	AFQT R=	AFQT + TAPAS R=	ΔR (Incremental)
Job knowledge	.476	.493	.017
Effort (e.g., persistence, attention, working hard)	.184	.247	.063
Physical ability	.035	.281	.246
Discipline	.036	.250	.214
Attrition	.049	.236	.188

Source: Data from Knapp and Heffner (2010), 42 (Table 5.6).

2. Research Proposition – Validity

There are ethical and legal justifications for investigating how well we can validate different uses of competencies. Employers can minimize the possibility of biases (intentional and inadvertent) that influence human capital management decisions by empirically validating competency systems as indicators of employee performance quality. Validity measures need to advance along with increasing uses of competencies. These measures provide essential evidence that investments in competency models have useful payoffs and are justifiable in their use. Research should focus on improving methods to (1) assess and monitor validity of competency criteria for the selection, assignment, and promotion of personnel and (2) predict future workplace behavior more effectively.

A human capital management system that includes the competencies acquired/ demonstrated by individuals, the competencies required for a position, and the subsequent

performance evaluation of the individual in the position would allow for validity assessment of competencies. If there were a match between the competencies of individuals and the competencies of the positions that he or she held and if the individual's performance in the position was rated high, the use of competency could be considered valid. However, if the individual's performance ratings were not correlated with the match of competencies, the use of competencies in that particular instance should be questioned and addressed.

D. Tailoring

The process of adapting general competency structures and databases to suit organizational missions and functions can take extensive effort and presents many difficulties. Each organization has a different mission, purpose, structure, and employment need. Therefore, it is logical that a competency system to satisfy one organization's strategic perspective should have differences from another organization. Such diversity of organizations is a challenge to standardization efforts, except at generic levels. That leads to a need for competency databases with better methods and tools for mining information from multiple (organizational) perspectives. Organizations may study what others have done but only as a step in developing their own competencies. Better methods are needed for adapting all-inclusive competency structures and databases to fit organizational specifics. Perhaps, competency data structures designed to satisfy multiple uses simultaneously would help reduce the time-consuming process of custom fitting each application (e.g., selection, assignment, training and career development, and performance evaluation) for a particular organization.

1. Example – DoD and Military Services

DoD, with its different military Service components (i.e., Army, Air Force, Navy, and Marines) and civilian workforce, illustrates the challenges of applying systems that meet an overall organization's needs while also allowing individual components the flexibility to determine specific needs. For examples, the DoD's military occupational classification systems for enlisted personnel are described for the Army (Department of the Army 2007), the Air Force (U.S. Air Force 2013); the Navy (U.S. Navy 2016), and the Marines (Headquarters, United States Marine Corps 2013). The systems were developed independently by each Service, and, although no common DoD structure for competencies exists across Services, military occupations are listed within the higher level, common SOC structure. An added complexity embedded in the DoD systems is tradition and a desire to maintain separate identities and cultures across Services.

While military occupations (i.e., titles) are listed in the SOC, these descriptions are broad and general. For example, one of the occupations is titled Radar and Sonar Technicians (SOC 55-3017). The description is to operate equipment using radio or sound wave technology to identify, track, and analyze objects or natural phenomena of military interest

(e.g., airborne, shipboard, and terrestrial positions). Also, an incumbent may perform minor maintenance (U.S. Bureau of Labor Statistics 2010b). This job description glosses over the differences across Services and generalizes across different positions such as a Ground Radar Systems specialist (i.e., Air Force Specialty Code 1C8X1), Air Traffic Controller Operator (i.e., Army MOS 15Q), or a Sonar Technician on a Submarine (i.e., Navy Enlisted Rating STS).

Tailoring occupational descriptions for Defense civilian jobs is somewhat less demanding than for uniformed positions. Civilian personnel within DoD are categorized using the OPM-managed General Schedule (GS) Classification System job series, which are organized by functions (e.g., clerical, statistics) and jobs that have similar or related work and requirements. This structure allows the clustering of jobs that can be managed strategically and that can address changes in competency needs as missions change. However, organizational particulars and specialization in technical fields such as information technology also presents challenges. DoD continues to work with OPM to develop a more systematic approach and tools to better plan for and fill civilian jobs (Department of Defense 2013). In summary, no single existing competency system is applicable for all of DoD's needs.

2. Example – Office of the Director of National Intelligence (ODNI)

A perspective similar to the DoD personnel system emerges from ODNI. ODNI leads the U.S. Intelligence Community (IC), which consists of the 17 agencies and organizations (e.g., the Central Intelligence Agency (CIA); the Defense Intelligence Agency (DIA); the Intelligence Branch of the Federal Bureau of Investigation (FBI); the Drug Enforcement Administration's (DEA), Office of National Security Intelligence; the Department of the Treasury's Office of Intelligence and Analysis (OIA); and the Department of State's Bureau of Intelligence and Research (INR)) within the Executive Branch. These independent organizations collaboratively gather and analyze intelligence for foreign relations and national security activities.

ODNI is leading an effort to implement a set of core competencies for its community (Office of the Director of National Intelligence (ODNI) 2010; Office of the Director of National Intelligence (ODNI) 2012; Office of the Director of National Intelligence (ODNI) 2014). The focus is on a general set of IC–wide competencies such as "technical expertise." However, there are underlying agency-specific knowledge and skills (e.g., specific analytic software tools), a variety of terms to describe them, and variations in tradecraft across agencies. The effort is intended to provide some consistency about how IC professionals are evaluated. However, this project is hindered by the different systems and descriptors that have been used for a long time and are culturally embedded in individual agencies.

An incentive to change those cultures and unique terms is focused on fostering mobility across organizations, a requirement for promotion to senior-level positions. The

ODNI challenge is to craft standardized job descriptions that allow agencies to tailor and define job specifics without losing the characteristics that are in common across the IC. Such tailoring also is needed as part of developing common learning objectives and performance criteria. The goal is to have a unifying structure across the IC through the use of the core competencies but still allow tailoring at the individual agencies to accommodate specific needs.

3. Research Proposition – Tailoring

Methods and techniques that can efficiently adapt general competency sets to meet specific organizational circumstances more efficiently should be developed. These methods and techniques should include how to address specific needs of an organization so that the broader, more general set of competencies can be readily adapted. Currently, general competency models provide lists and job classifications only as a starting point for specific uses. The result is that organizations require extensive manual labor to use the information—if they use it at all. The rationale for this research proposal is that organizations would be more likely to link with a higher order set of competencies if methods existed to help tailor those to specific use cases.

E. Credentialing

Credentialing indicates that a person has qualifications and competence to perform a job, as determined by the credentialing authority. However, no generally accepted standards are in place for credentialing or its enforcement. The official recognition, licenses, certifications, or evidence of apprenticeships (all of which are examples of credentialing) occur whenever a group or organization attests to an individual's background and legitimacy. However, even when credentialing is done with well-defined standards and procedures, the evidence for a credential's utility is limited for several reasons:

- Employers' needs change, and credentialing information may not be updated quickly; therefore, outdated requirements may be included as part of credentialing criteria.

- The credentialing authority may or may not be trustworthy from a quality perspective, as in the case of some disreputable colleges or certification "teach-to-the-test" boot camps.

- Competencies can atrophy. For instance, a certificate earned years before may no longer adequately represent a person's true capabilities, especially if these capabilities have not been well exercised (a particular problem among Defense foreign-language users).

- Data are not collected about how employment rates or work performance differs for those who have credentials vs. others, suggesting that the validity of the credentials may be questionable.

The development of improved links between credentials and jobs could increase the likelihood of employer-employee satisfaction. Several parallel efforts by community colleges, industry associations, and government-military strive to match individuals and their qualifications with employers' needs [e.g., The Advanced Distributed Learning Military Micro-Credentials (ADL MIL-CRED) research project[8]]. However, organizations are studying the problem from different perspectives and could benefit from greater collaboration.

Community colleges are accepting an increasing role in credentialing by developing specific curricula and courses. These institutions provide a mechanism for credentialing the workforce, particularly in their geographic area of influence. Community colleges can regularly meet with local employers and identify the competencies needed. They can also develop specialized curricula and courses for approval by the state's Department of Education, but this effort takes time and resources. A significant feature of these specialized courses is that they can rapidly meet the changing needs of industry (i.e., supply and demand), but it is a continual effort to maintain relevancy.

Industry-specific business associations and trade groups also help mold the work force through credentialing (Bosworth and Frugoli 2013). These organizations are founded and run by businesses within a specific industry to focus on collaboration among companies. To help foster better education and consistent competencies within industries, DOL has teamed with industry partners and provided them grants under an initiative called the Competency Model Clearinghouse (U.S. Department of Labor 2016b). The industry partners develop and maintain dynamic models of the foundation and technical competencies that are necessary for American industries. The goal of the effort is to promote an understanding of the skill sets and competencies that are essential to educate and train a competitive workforce.

1. Example – Credentialing Opportunities On-Line (COOL)

For military Service members, COOL focuses explicitly on communicating job requirements for credentialing of veterans:

- Army (U.S. Army 2016),
- Navy and Marines (Department of the Navy 2016), and
- Air Force (Air Force Virtual Education Center 2016).

These resources help veterans understand how their military experience and training relates to civilian jobs and how best to obtain necessary credentials. Analysis by the DOL's

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[8] The MIL-CRED project aims at designing, developing, and testing a standardized micro-credential model that facilitates transition of military personnel to civilian careers and educational opportunities (see Advanced Distributed Learning (2016)).

Employment and Training Administration (ETA) has identified how information on civilian certifications and licenses relates to MOSs. COOL was created with subjective assessments by individuals reading through competency descriptions and credentialing requirements to determine appropriate transferability (SOLID, LLC 2014).

The system provides only initial information to Service members, who must then translate military experience and training into equivalent civilian credentials using the vast O*NET database and careeronestop.org (U.S. Department of Labor 2016a). COOL explains how to meet civilian requirements and provides links to numerous resources to help get started. COOL, still a work-in-progress, does not do the translation. Currently, when a Service member puts his or her military specialty into the system, he or she is provided a listing of various credentials, certifications, and state licensing links that are somewhat similar to the military specialty. The system provides many links, including those that have little relevance to the military specialty. In addition, each state can establish different requirements for credentials, which adds a level of complexity to the COOL efforts.

2. Example – Career Readiness Certificate

To certify whether individuals possess the requisite skills and abilities to enter the workforce, ACT, the corporation formerly known as American College Testing, developed a general assessment called the Career Readiness Certificate (Ausman 2008, Clark et al. 2013.). The ACT National Career Readiness Certificate (ACT NCRC) is an assessment-based credential of the essential work skills that are needed for success in jobs across industries and occupations (Mattern et al. 2014). These foundational skills, also known as *WorkKeys*, include proficiency in basic mathematic operations and being able to solve complex work-related math problems, reading for comprehension some documents that are common to the workplace, identifying and applying specific information in common business graphics, applying standard business technologies, and determining the relevance of written information. The ACT NCRC is intended to provide job applicants a work skills credential that demonstrates potential for career success.

For employers and HR professionals, the ACT NCRC is expected to be a trusted indicator of work skills that, along with other selection tools, can inform selection and assignment decisions (Mattern et al. 2014). The components of the ACT NCRC have been shown to relate to positive work setting performance and behavior (Camara et al. 2015). However, no empirical research could be found on the correlation between the scores on the NCRC and work performance ratings.

3. Research Proposition – Credentialing

The utility of credentials from education/training that uses well-defined standards and procedures will diminish because of skill decay over time and changes in employer requirements. Longitudinal research should address the role of credentials in getting hired and being successful on the job. It also should address how often credentialing would benefit from refresher training, which will, of course, differ from one industry's jobs to another's. The rationale for this research proposition is that better evidence about the utility of credentialing and its underlying competencies can be an important criterion to strengthen our workforce, including our many veterans, and our industries.

F. Automation

Mission analysis, occupational/job analysis, and competency development for an organization are all human-labor intensive. A good competency model touches every aspect of human capital management: developing position descriptions, recruiting, structuring interviews, selecting personnel, assigning individuals to developmental positions, evaluating personnel for performance and promotion, and so forth. The system must address the competencies needed to perform the work and the expectations about how a person should perform the work. Currently, no efficient way is available to map competency descriptions to specific jobs in an organization and to match those descriptions with the qualifications of candidates/employees for an organization. The issue is how automation can facilitate the development and uses of competencies.

The principal role of automation today is for developing competency databases. The focus is on repositories of competencies—whether in O*NET (DOL) or MOSAIC (OPM), companions to those databases, or as part of an organization's personnel system. Research should address four important additional functions for automation: (1) methods and tools for tuning general competencies to match an organization's positions and human capital management functions, (2) measurement tools that help personnel specialists judge the quality of applicants for positions, (3) ongoing validation and refinement of organizational competency models based upon evidence collected over time, and (4) cross-organizational translation of competencies, such as when an individual moves to a new employer or graduates from a school into the workforce.

1. Example – Automation for DoD Civilian Hiring

A recent OPM initiative, in cooperation with DoD civilian personnel agencies, is designed to assess civilian applicants' job-relevant competencies (OPM.GOV, "Assessment & Selection: Competencies," n.d.). The Army, Navy, and some other Defense agencies are using USA Hire (Defense Finance and Accounting Service (DFAS), n.d.), an online assessment tool for job applicants developed by OPM (OPM.GOV, "Assessment & Evaluation: Online Assessment," n.d.). The goal is to improve the quality of applicant

referrals for jobs by assessing general competencies such as decision making, attention to detail, and integrity/honesty. For all applicants who are deemed "acceptable" through a standard technical assessment, USA Hire will function as a secondary filter to distinguish general competencies that may be held by applicants to provide better prediction of subsequent job performance and diminish the potential of applicant score inflation.

USA Hire can be administered in an unproctored environment and can be paired with occupational questions to assess technical competencies. The assessment items are presented as multiple choice and simulation-based questions about critical job competencies. The responses to the questions are automatically assessed and the applicants are ranked based on pre-determined weightings of the assessment weightings. The initial pilot test was for a few civilian occupations, with an expectation to expand the program. (See, for example, Department of the Navy (2015)).

2.   Research Proposition – Automation

Automated capabilities are needed to facilitate the currently human-intensive development and use of competencies in all phases of personnel practices. Automation can assist with ways to adapt general competency databases to organizations more easily. It also can assist organizations in more easily compiling information in assessing people's skills for hiring and evaluating their job performance. For example, The Advanced Distributed Learning's (ADL) xAPI effort (Advanced Distributed Learning 2015) is working to develop a specification for gathering and recording individuals' experiences, which could assist with populating competency systems automatically. How can we employ automation to collect, organize, and provide competency information in a form readily accessible for the needs of individual organizations? HR departments do not have the workforce and time to gather and organize the complexities of information for comprehensive competency systems. The rationale for this broad-based automation research is to facilitate the connection between competency databases and organizational needs.

5.   Summary and General Conclusions

No consistent use of competencies is evident across the organizations that IDA studied. In addition, the variety of reasons for developing competency systems creates confusion about what competencies are and about their utility. To help structure these findings, IDA developed a schema about how competencies could be a valuable mechanism to manage human capital from a strategic organizational and an individual personnel perspective. To characterize the state of the practice, IDA identified six issues (see Section 5.B) and made research propositions to improve competency use.

A.   Some Observations

Overall, competency systems are numerous, and the human-intensive resources to develop, maintain, and use these systems are considerable. Some comprehensive databases, such as DOL's O*NET and OPM's MOSAIC, can provide starting points for organizations. However, each organization must make significant investments to develop, tailor, or modify the competencies so that they satisfy specific organizational requirements and missions.

Differences across organizations extend to a lack of common terminology, one aspect of which is the lack of qualifying terms to clarify the contextual meaning of generic terms. For example, the term "leadership" is used frequently without identifying who/what is being led. Leadership of an IT division within a high tech company is different from leadership of an Infantry Division. Terminology differences also are an issue across databases from DOL, OPM, and DoD. These differences occurs in two ways, where the same words can be used to describe different things and where different words can be used to describe the same thing.

Of the organizations reviewed, the State Department and its use of precepts (competencies) for Foreign Service Officers came the closest to fulfilling IDA's schema. The State Department has a written description of the organization's needs and personnel characteristics to satisfy these needs. The system is conceptually linked to the QDDR that provides a mission/vision for what the organization strives to accomplish. From themes in the QDDR, the precepts are connected to expectations by individuals who are Foreign Service Officers. The precepts and their subprecept breakdown are used to inform employees' evaluation and development/education processes.

B. Competency Issues and Research Propositions

Six issues and research propositions illustrate the current state of the practice and highlight complexities of using a competency system to manage, recruit, select, train, develop, and evaluate personnel with clear links to an organization's mission.

- **Taxonomy.** Diverse structures and categorization taxonomies are used across organizations and occupational databases to describe competencies, which leads to difficulties in comparing people or jobs.

  - *Research proposition.* Develop tools and methods to crosswalk/translate from one competency taxonomy/system to another, which would increase the systems' utility to employers and job candidates.

- **Granularity.** Inconsistency is common in the level of detail (e.g., broad/general or detailed/specific) to describe specific positions, a particular job, or a broader occupation across and within competency systems. Such variations cause difficult decisions about the appropriate competencies to use because it is often unclear which ones are for specific situations and which ones may be for many/all situations.

  - *Research proposition.* Develop a consistent means to address multiple levels of granularity in competency systems for distinguishing their purposes and relevance to different uses.

- **Validity.** Little empirical validation of competencies is available, so the relevance of particular competencies to jobs and performance is not well substantiated. Content or face validity is the most common form of assessment but is less robust than assessment that depends on quantitative performance evidence. Organizations seek to validate jobs and job requirements to justify personnel practices, including decisions to hire, promote, and terminate employees.

  - *Research proposition.* Develop improved methods to assess empirical evidence about the value of specific competencies to job performance evaluation. Methods should assess and monitor validity of competency criteria for the selection, assignment, and promotion of personnel and more effectively predict future workplace behavior.

- **Tailoring.** The process of adapting general competency structures and databases to suit organizational missions and functions can take extensive effort and present many difficulties. Organizations can study what others have done or extract from generic databases of competencies to leverage existing resources; however, even such initial steps are resource intensive.

  - *Research proposition.* Develop methods and techniques to adapt general competency sets to meet specific organizational circumstances more efficiently.

- **Credentialing.** Credentialing is one accepted means of verifying personnel qualifications that are assumed to correlate well with successful employment. However, data that demonstrate the utility of credentialing are lacking. In addition, credentialing must address how to satisfy changing requirements of employers and skill level of individuals over time.

  – *Research proposition.* Assess the utility of credentialing education/training requirements and time limits for when refresher training and new credentials are needed because of skill decay or changing requirements.

- **Automation.** The development and use of competency systems currently is resource intensive. The principal automation tool available today is to leverage the existing database compendiums for generic uses that are, in many cases, not tied to any organization's needs. More efficiency in implementing a competency-based system of personnel management is essential to facilitate widespread use.

  – *Research proposition.* Create competency data manipulation tools that incorporate automation to adapt general-purpose databases for needs of organizations and assist in compiling information to assess people's skills for hiring and evaluating job performance.

Implementation obstacles must be overcome in developing a comprehensive competency system that seamlessly functions as the human capital management backbone for an organization to recruit, select, assign, develop, and manage the workforce. A system that effectively links the organization's mission to the individual capabilities of the entire workforce is a worthwhile goal. Currently, some organizations use competency systems for specific purposes, and there are potential benefits of expanded uses to better meet management and employee needs. This report advocates for continued research about ways to develop and employ competencies more effectively and efficiently.

Appendix A.
Illustrations

Figures

Tables

Appendix B.
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Appendix C.
Abbreviations

ACT	(formerly the) American College Testing
ACT NCRC	ACT National Career Readiness Certificate
ADL	Advanced Distributed Learning
ADL MIL-CRED	Advanced Distributed Learning Military Micro-Credentials
AFECD	Air Force Enlisted Classification Directory
AFQT	Armed Forces Qualification Test
ASVAB	Armed Services Vocational Aptitude Battery
CIA	Central Intelligence Agency
CFR	Code of Federal Regulations
COOL	Credentialing Opportunities On-Line
DEA	Drug Enforcement Administration
DFAS	Defense Finance and Accounting Service
DIA	Defense Intelligence Agency
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DOL	Department of Labor
DOT	Dictionary of Occupational Titles
DRRS	Defense Readiness Reporting System
EEEM	Expanded Enlistment Eligibility Metrics
ETA	Employment and Training Administration
FBI	Federal Bureau of Investigation
GS	General Schedule
HR	human resource
HRSG	Human Resources Systems Group
IC	Intelligence Community
IDA	Institute for Defense Analyses
INR	Bureau of Intelligence and Research
IT	information technology
KSA	knowledge, skills, ability
METL	Mission Essential Task List
MOC	military occupational code
MOS	military occupation specialty
MOSAIC	Multipurpose Occupational Systems Analysis Inventory - Close-Ended
MS	Mircosoft
NAVPERS	Naval Personnel Command

NEC	Navy Enlisted Classification
O*NET	Occupational Information Network
OCHR	Office of Civilian Human Resources
ODNI	Office of the Director of National Intelligence
OIA	Office of Intelligence and Analysis
OOH	Occupational Outlook Handbook
OPM	Office of Personnel Management
PULHES	P stands for "Physical capacity or stamina"
	U stands for "Upper extremities"
	L stands for "Lower extremities"
	H stands for "Hearing and ears"
	E stands for "Eyes"
	S stands for "Psychiatric"
QDDR	Quadrennial Diplomacy and Development Review
SHCP	Strategic Human Capital Planning
SME	subject matter expert
SOC	Standard Occupational Classification
STS	Sonar Technician Submarines
TAPAS	Tailored Adaptive Personality Assessment System
USD(P&R)	Under Secretary of Defense for Personnel and Readiness

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14. ABSTRACT

Competencies can be defined as observable and measureable patterns of knowledge, abilities, skills, and other characteristics that individuals need to be successful in their position for an organizations. There is inconsistency in how competency systems are developed and used by organizations, which may lead to confusion over what competencies are and how competencies can be used. IDA reviewed multiple organizations that are using some form of competency system to determine the state of the practice. This review revealed a set of issues for using competency systems or job descriptions, which include the use of different competency taxonomies that were not comparable, inconsistency in level of specificity with competencies, few empirical validations of systems, difficulties with tailoring competencies to specific organizational requirements, and little automation in processes. Based on the issues identified, a set of research propositions for next steps to advance the use of competencies are proposed.

15. SUBJECT TERMS

competencies, human capital management, job descriptions, occupational analysis

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