The Development of the Hogan Competency Model & Competency-Based Predictive Algorithms

THE SCIENCE OF PERSONALITY

Introduction

During the past several years, Hogan Assessment Systems (hereafter "Hogan") witnessed an increase in the number of requests for competency-based reports as more organizations develop and use competency models. To identify relationships between commonly used competencies and personality, we developed the Hogan Competency Model (HCM). This model provides a foundation for (a) updating the competency section of Hogan's job analysis tool, the Job Evaluation Tool (JET), (b) developing algorithms that drive client competency-based reports, (c) providing a structure for coding criterion data in the Hogan archive, and (d) updating the synthetic validity evidence used for validity generalization (VG).

This report outlines the development of the HCM and describes how the Hogan Research Division (hereafter "HRD") uses the model to conduct personality-related research. The HCM has three advantages. First, we designed the model to have minimal overlap between competencies, allowing us to better measure specific behaviors. Second, we designed competencies to target specific areas of performance. In contrast, many models target several behaviors with a single competency. This lack of specificity contaminates measurement and subsequent prediction of the competency. Finally, our development process centered on a review of 21 competency models used across academic, commercial, and government settings. This both assures that the model is comprehensive and that it can be easily compared to and used in conjunction with other competency models.

History and Development of Competency Modeling

Global markets require organizations to simultaneously work within different locations, legal environments, and cultures. As a result, traditional task-based job analysis procedures may lack the flexibility required to identify the knowledge, skills, and abilities essential for success in many jobs (Barnes-Nelson, 1996; Olian & Rynes, 1991; Sanchez, 1994). Therefore, organizations often use competency models to align many of their Human Resource Management applications.

The work of David McClelland (1973) set the stage for the widespread growth of competencies. McClelland argued that aptitude tests, almost universally used to predict performance, do not serve their intended purpose well and are prone to cultural biases. Also, he argued that other traditional measures, such as examination of results and references, are equally poor at predicting job success. Instead, McClelland suggested that individual competence might provide a more promising alternative for predicting performance. He described competencies as representing groups of behaviors underlying individual characteristics that enable superior job performance.

Competencies appear in educational, training, employment, and assessment contexts, where often a primary goal is identifying individual characteristics that lead to success (Boyatzis, Stubbs, & Taylor, 2002; Rubin et al., 2007; Spencer & Spencer, 1993). Companies can link individual characteristics to competencies that represent critical job components. Then they can use this information to select individuals with these characteristics and guide development and training efforts.

The 1980s witnessed a growth in using competencies to identify and predict leadership effectiveness and long-term success (Boyatzis, 1982; McClelland & Boyatzis, 1982). These applications led to the development of high-level management and leadership competency models (Hollenbeck, McCall, & Silzer, 2006) and competency-based selection tools, such as behavioral event interviews (Boyatzis, 1994; McClelland, 1998; Spencer, McClelland, & Spencer, 1994). Competencies also provide a structure for linking performance with cognitive ability and personality (Heinsman, de Hoogh, Koopman, & van Muijen, 2007), coaching employees to overcome dysfunctional behavior (Boyatzis, 2006), and selecting and developing high potential employees (McClelland, 1994).

Development of Hogan Competency Model

Competency Evaluation Tool

The Competency Evaluation Tool (CET), which most recently contained items representing 56 competencies, is a standard part of the JET. Although the CET has undergone several changes, ranging at times from 41 to 65 competencies, the 56-item version was in place for 5 years prior to the changes described in this report. The CET asks Subject Matter Experts (SMEs) to indicate the degree to which each competency relates to successful performance in the job or job family under study. SMEs, anyone that is familiar with the job's requirements and characteristics that lead to high performance, typically include supervisors, high-performing incumbents, and co-workers. Direct reports, trainers, and customers have also served as JET SMEs. SME ratings provide a basis for structural models used to examine comparability of job domains and their competencies across jobs (J. Hogan, Davies, & R. Hogan, 2007).

Although the CET remains a useful and integral part of Hogan's job analysis process, an increasing amount of work based on client's competency models lead to a critical review of the most recent 56-item version of the CET. We concluded that three areas needed to be addressed. First, some competency definitions required revision because they (a) included multiple concepts, (b) overlapped significantly with other competencies, and/or (c) were unclear. Second, some competencies that companies commonly included in their models were missing from the 56-item version of the CET. Third, there was no underlying structure to the model. We incorporated the Domain Model of Job Performance (hereafter 'Domain Model'; Hogan & Warrenfeltz, 2003; Warrenfeltz, 1995) into the HCM as the main structure of the taxonomy.

Domain Model

Researchers can use the Domain Model to effectively classify existing competencies into a comprehensive and meaningful performance model (Hogan & Warrenfeltz, 2003; Warrenfeltz, 1995), leading to easier interpretations of and comparisons across models. The Domain Model contains four domains:

- **Intrapersonal Skills** – Intrapersonal skills develop early in childhood and have important consequences for career development in adulthood. Core components include core self-esteem, resiliency, and self-control. Intrapersonal skills form the foundation on which careers develop.

- **Interpersonal Skills** – Interpersonal skills concern building and sustaining relationships. Interpersonal skills can be described in terms of three components: (a) an ability to put oneself in the position of another person, (b) an ability to accurately perceive and anticipate other's expectations, and (c) an ability to incorporate information about the other person's expectations into subsequent behavior.

- **Business Skills** – Business skills differ from Intrapersonal and Interpersonal skills in that they are (a) the last to develop, (b) the easiest to teach, (c) the most cognitive, and (d) the least dependent upon dealing with other people. Business skills involve comparing, compiling, innovating, computing, analyzing, coordinating, synthesizing, and so on.

- **Leadership Skills** – Leadership skills can be understood in terms of five components that depend upon intrapersonal, interpersonal, and business skills. First, leadership skills entail an ability to recruit talented people to join the team. Second, one must be able to retain talent once it has been recruited. Third, one must be able to motivate a team. Fourth, effective leaders are able to develop and promote a vision for the team. Finally, leadership skill involves being persistent and hard to discourage.

R. Hogan and Warrenfeltz (2003) suggest that the four domains form a natural, overlapping developmental sequence, with the latter skills (e.g., Leadership Skills) depending on the appropriate development of the earlier skills (e.g., Intrapersonal Skills). Each of the performance domains can be further decomposed into various performance dimensions or competencies. Table 1 outlines the complete Domain Model, illustrating the links between common competencies associated with each domain and Five Factor Model (FFM) personality measures. Each competency in the HCM falls under one of the four domains.

Table 1 Domain Model of Job Performance, Example Competencies, and Personality Measures

Metaconcept	Domain	Example Competency	FFM Measurement
Getting Ahead	Leadership	Achievement	Surgency/Extraversion
		Building Teams	
		Business Acumen	
		Decision Making	
		Delegation	
		Employee Development	
		Initiative	
		Leadership	
		Managing Performance	
		Resource Management	
	Business	Analysis	Openness to Experience
		Creating Knowledge	
		Decision Making	
		Political Awareness	
		Presentation Skills	
		Problem Solving	
		Safety	
		Technical Skill	
		Training Performance	
		Written Communication	
Getting Along	Interpersonal	Building Relationships	Agreeableness Surgency/Extraversion
		Communication	
		Consultative Skills	
		Cooperating	
		Influence	
		Interpersonal Skill	
		Organizational Citizenship	
		Service Orientation	
		Teamwork	
		Trustworthiness	
	Intrapersonal	Dependability	Conscientiousness Emotional Stability
		Detail Orientation	
		Flexibility	
		Following Procedures	
		Integrity	
		Planning	
		Respect	
		Risk Taking	
		Stress Tolerance	
		Work Attitude	

Creating the HCM

HRD designed the HCM to align with other well-known competency models and personality measures. The development of the HCM included five steps. First, we reviewed the competency definitions in the 56-item version of the CET, flagging competencies that measured multiple constructs or overlapped with other competencies. Next, we reviewed 21 academic, commercial, and government competency models and compared them to the CET (see Appendix A for a list of the models). Three HRD researchers independently mapped the original 56 competencies to each comparison model. Based on all available information from the first two steps, we eliminated redundant competencies, clarified definitions, and added frequently occurring and missing competencies. Fourth, we obtained feedback from non-Industrial/Organizational (I/O) professionals on the revised list of competencies. Finally, four HRD researchers again independently mapped the revised competency model to each of the 21 comparison models. The resulting model included 58 competencies in addition to the 4 domains. The following sections further delineate these steps.

Competency Definitions

We began by examining the competencies and definitions on the 56-item version of the CET. First, HRD identified overlapping competencies by examining competency definitions and correlating CET ratings obtained on a sample of over 500 jobs. Results indicated that several competencies overlapped both conceptually and statistically. For example, Trustworthiness and Integrity overlapped significantly, as did Adaptability and Flexibility. Furthermore, other models often treated these and other pairings as one competency.

Next, we reviewed competency definitions. We flagged competency definitions that (a) included the competency name in the definition, (b) contained multiple concepts, (c) overlapped with other competencies, or (d) were generally unclear. For example, Innovation was defined as "finding innovative solutions…," and the definition of Planning/Organizing addressed multiple concepts (resource management and time management), but not aspects of organization typically addressed by similar competencies in other models.

Competitor and Academic Competency Models

Next, we reviewed 21 independent competency models and compared the CET to the identified models. These models came from academic, commercial, and government sources. We identified competency models using three strategies. First, we conducted a literature search for publications outlining relevant competency models (e.g. Tett, Guterman, Bleir, & Murphy, 2000). Next, we contacted partner organizations, including clients and distributors, and asked for their competency models. Finally, we contacted companies and competitors with well-advertised or commonly-used models (e.g. SHL, Bartram, 2005). We only reviewed complete models containing complete competency definitions. Our final sample consisted of 6 commercial, 12 academic, and 3 government agency models. Appendix A presents a complete list of the models.

Competency Mapping

Competency mapping consisted of three phases.

Phase 1: I/O Professionals. Three HRD researchers independently mapped the CET to each competency in the 21 comparison models. Raters indicated if the competencies in the other models mapped directly to a Hogan competency, more than one Hogan competency, or none. In addition, each rater maintained a list of frequently occurring competencies that mapped poorly to Hogan competencies or were not included in the Hogan model. We aggregated the results and the raters met to resolve conflicts and reach a final consensus. Based on these final results and our previous review of competency definitions, we eliminated redundant competencies, clarified definitions, and added missing competencies.

Phase 2: Non I/O Professionals. To better represent individuals who will use the model in the future, we asked four non-I/O professionals to provide feedback on the revised list of competencies. Our goal was to ensure that all competencies were easy for the target population to understand and use. We obtained feedback from non-I/O professionals with extensive business experience and expertise in different areas (IT, Finance, Sales, and Operations). First, each individual independently mapped each competency into the Domain Model, noting if each competency fell under one primary domain and potentially a secondary domain. Second, they provided recommendations for the content and phrasing of the competency names and definitions. The raters successfully placed 43 of the competencies into the same domain, indicating high rater agreement. Furthermore, no rater noted any problems with the competency model names and definitions, indicating that the model is intuitive and not overly laden with I/O jargon.

Phase 3: Re-mapping: I/O Professionals. Finally, four HRD researchers again independently mapped the revised competency model to each of the 21 comparison models and met to reach a final consensus. The number of competencies that mapped to the comparison models greatly increased from phase 1. However, we found a few definitions that needed further revision and identified four additional competencies for inclusion. For example, because 7 of the 21 comparison models contained Valuing Diversity, we added it to the Hogan model. The resulting competency model includes 58 competencies, plus names and definitions for the 4 components of the Domain Model. Appendix B presents the resulting HCM. Appendix C presents a crosswalk between the 56 Item CET and the 62 Item CET.

Overall, each Hogan competency averaged seven mappings. We mapped each model to the Hogan model a minimum of three times. This represents over 12,480 individual comparisons of the Hogan model to the comparison models. This finding provides further support for the comprehensiveness of the Hogan model.

Using the HCM

Job Analysis

The JET contains five sections. The first four align with Hogan inventories: the Hogan Personality Inventory (HPI), Hogan Development Survey (HDS), Motivation, Values, Preference Inventory (MVPI), and Hogan Business Reasoning Inventory (HBRI); the fifth is the CET. The CET asks SMEs to indicate the degree to which each of the listed competencies relates to successful performance in the job or job family under study. Raters evaluate each competency using a five-point scale ranging from "0" (*Not associated with job performance*) to "4" (*Critical for job performance*). Critical competencies must receive an average score of at least "3" (*Important for job performance*). These ratings serve a number of purposes, such as identifying competencies to use in synthetic validation for the HPI and HDS, showing similarities across roles in job comparison studies, determining the importance of an organization's existing competency model components, or serving as the foundation for creating a new competency model to represent and drive performance for a job or job family.

Competency Mapping Studies

As more companies use competency models for a variety of purposes, the need to align personality instruments with customized competency models continues to grow. Although competency models invariably differ across organizations, similarities often exist. HRD developed the HCM to capture these similarities by continually reviewing a wide range of existing competency models throughout the development process. As a result, HRD can easily map HCM competencies to the vast majority of competencies presented in other models.

During the mapping process, Hogan SMEs, consisting of expert Ph.D.- and Masters-level practitioners, evaluate both competency models and indicate which HCM competencies align with each of the client's competencies. Often, client competencies are broad and align with multiple HCM competencies. When that is the case, HRD can combine HCM competencies to adequately align with the client's model. During the mapping process, HRD resolves disagreements among SMEs through a group decision-making task where they discuss the disagreement(s) and come to a consensus as to which HCM competency best aligns with the corresponding client competency.

Competency mapping studies serve a number of purposes, such as identifying personality scales that are predictive of performance for a job or aligning CET results to verify that competencies in a client's existing model are important for performance. Competency mapping studies may also be the first step in more comprehensive studies. By first aligning HCM competencies with competencies in a client's model, HRD can more effectively use JET data and data in the Hogan archive to answer critical research questions.

Criterion-Related Research

Aguinis, Henle, and Ostroff (2001) described criterion-related validity in terms of the relationship between the predictor (e.g., HPI Scales) and some criterion measure (e.g., job performance), with the goal of answering the basic question: how accurate are test scores in predicting criterion performance? Criterion-related validity not only provides the most direct evidence of relationships between predictor scores and job performance, but serves as the foundation for VG studies and the development of off-the-shelf selection solutions. As such, researchers have conducted criterion-related validation studies using Hogan assessments on over 250 jobs and job families over the last 30 years. The Hogan archive contains data and results from these studies, which cover a range of industries, organizations, and jobs.

The *Uniform Guidelines* state that "evidence of the validity of a test or other selection procedure by a criterion-related validity study should consist of empirical data demonstrating that the selection procedure is predictive of or significantly correlated with important elements of job performance" (29 C.F.R. § § 1607.5 (B); EEOC, 1978). Ratings gathered from performance rating forms serve as the most commonly used and often most informative source of criterion data. HRD frequently uses CET results to inform the creation of performance rating forms for criterion-related validation studies. Specifically, we use CET ratings to identify the 10-15 most important competencies for a job or job family. Then, HRD writes performance-related items for each competency, assuring that performance ratings gathered from criterion-related validation are both comprehensive and job relevant.

Synthetic Validity/Job Component Validity

Mossholder and Arvey (1984) defined synthetic validity as "the logical process of inferring test-battery validity from predetermined validities of the tests for basic work components" (p. 323). If we know the key components of a job, we can review prior criterion-related studies predicting those components. We then "synthesize" the valid predictors of the key job components into an assessment battery for the new job (Balma, 1959; Lawshe, 1952). Brannick and Levine (2002) point out that synthetic validity allows us to build validity evidence from small samples with common job components. Although not popular at its inception, published research on synthetic validity has become increasing more common (e.g., Hoffman, Holden, & Gale, 2000; Jeanneret & Strong, 2003; Johnson, Carter, Davison, & Oliver, 2001; McCloy, 1994, 2001; Scherbaum, 2005).

J. Hogan, Davies, and R. Hogan (2007) outline the process Hogan uses for synthetic validity. Synthetic validation involves (a) identifying the important components of a job or jobs comprising a job family, (b) reviewing prior research on the prediction of each component, and (c) aggregating correlations across multiple studies for each component to form a test battery (Scherbaum, 2005). Because the concept of synthetic validity has evolved over 50 years, Hogan uses interchangeably the terms criteria, performance dimensions, job components, work components, competencies, and domains of work. Thus, the competencies in the HCM serve as job components and provide a structure for coding data in the Hogan archive.

The first step in synthetic validation is conducting a job analysis where SMEs identify the important components of a job. Using data in the Hogan archive, HRD developed and maintains a synthetic validity table that shows relationships between assessment results and each HCM competency. These results represent relationships between predictor scores and competency performance across organizations, industries, and jobs. The most recent update to this table occurred in 2010, when HRD mapped performance results from thousands of criteria measures collected from over 250 jobs onto the HCM competencies. HRD then conducted a series of meta-analyses (see Hunter & Schmidt, 2004) to combine results across studies. These meta-analyses provide stable estimates of the relationships between results on both the HPI and HDS and job performance ratings aligned with the HCM competencies.

Competency-Based Reports

Hogan generates two types of competency-based reports. First, client-specific reports present results in terms of predictive scores on client competency models. HRD uses competency mapping and both local criterion-related research and archival data to create predictor scales from HPI, HDS, and MVPI results. Second, off-the-shelf competency-based reports, such as Configure and the Safety report, present predictor scores on competency models that are specific to areas of performance but generalize across jobs. For example, safety is an important component of many jobs. Hogan developed a Safety Competency model containing six dimensions that represent different components of safe behavior. HRD then used archival data to create predictor scales for each dimension from HPI results.

Conclusions

Competency models have several advantages. First, when coupled with job analysis, the use of competencies ensures that organizations focus on job relevant behaviors. This both increases the predictive accuracy of a selection system and minimizes legal risk. Second, competency-based reports present personality assessment results using language that is familiar to the client. Third, they allow organizations to streamline their selection process by focusing on competencies that (a) are often assessed using other selection instruments, thereby increasing the predictive accuracy of the overall selection system by assessing competencies through multiple methods; and (b) are important for a number of jobs, thereby allowing the organization to determine an applicant's fit with multiple jobs at once. Finally, they allow organizations to streamline interventions with existing employees, such as development/training efforts and performance assessment across departments and functions.

The HCM represents a significant improvement in Hogan's ability to provide clients with effective and easy to use competency-based solutions. These solutions allow clients to align personality assessment results with other organizational interventions aimed at hiring successful employees and developing existing employees. HRD developed the HCM using a unique and elaborate process to ensure that the model (a) comprehensively covers the majority

of behaviors required for success across organizations, industries, and jobs, (b) easily maps onto the majority of competencies in existing models, and (c) can be used to produce results that are both easy to use and understand.

Example Competency-Based Solution

The following section describes how competency models can be used to produce competency-based client solutions. Specifically, we illustrate the process of developing algorithms designed to predict and assess seven areas of performance.

Over the last 35 years, competencies have appeared in educational, training, employment, and assessment contexts, where the fundamental question involves determining which individuals possess the underlying characteristics likely to lead to success.

Consistent with this trend, one of Hogan's clients developed a competency model to link business strategy to talent management. This particular client collaborated with Hogan to construct and validate a measurement platform comprised of HPI-based algorithms capable of predicting performance as defined in terms of each target competency.

The HPI was the first measurement of normal personality developed explicitly to assess the FFM in occupational settings. The measurement goal of the HPI is to predict real-world outcomes. As such, it is an original and well-known measure of the FFM and considered a marker instrument for personality measures in English and other languages as well. For more information regarding test development and constructs measured, see Appendix D; for more information on the specific subscales that make up each of the seven primary scales, see Appendix E.

At the outset of the project, the client provided Hogan with a detailed list of competencies and definitions which the organization deemed critical to effective performance of the target job. Table 2 describes each competency in detail.

Table 2 Competencies & Definitions

Domain Area & Competency	***Definition***
Conflict Management	Identifying and taking steps to prevent potential situations that could result in unpleasant confrontations. The ability to remain calm and composed in tense or stressful situations. Managing and resolving conflicts and disagreements in a positive and constructive manner to minimize negative impact.
Consistency/Dependability	Accomplishing objectives properly and on time. Arriving on time, and performing with willing and voluntary support of the policies and processes of the Museum. Consistently putting forth best efforts and attempting to achieve the highest standards of performance.
Planning and Organizing	The ability to manage time and resources so that work objectives are accomplished on time. The ability to set priorities, create challenging goals, and measure goal progress.
Coaching and Developing Others	The ability to improve and reinforce the performance of others. Facilitating skill development by providing clear, behaviorally specific performance feedback, and making or eliciting specific suggestions for improvement in a manner that builds confidence and maintains self-esteem.
Change Mastery	Effective performers stay adaptable and effective in the company's continuously evolving business situation. They embrace needed change and modify their behavior when appropriate to achieve organizational objectives. They stay effective in the face of ambiguity. They understand and use change management techniques to help ensure smooth transitions.
Formal Communications (Public Speaking)	Effective performers are able to organize and deliver public speeches that effectively inform or persuade audiences. They are adept at using current presentation technologies and media formats. They are able to field audience questions comfortably and confidently.
Brand Understanding	Effective performers understand and support the mission of the company — they understand the general workings of the industry. They monitor activities and trends within this arena and maintain a current knowledge base. They use this knowledge to further the organization's goals.

Development of Competency-Based Scoring Algorithms

Combinations of personality facets consistently predict a range of work outcomes better than broad factors (Casillas, Robbins, McKinniss, Postlethwaite, & Oh, 2009; J. Hogan & Roberts, 1996; Ones, Dilchert, Viswesvaran, & Judge, 2007; Paunonen, Haddock, Försterling, & Keinonen, 2003; Tett & Christiansen, 2007). Consistent with this idea, Hogan's scoring algorithms represent mathematical equations that combine results from multiple personality scales to maximize the prediction of specific competencies.

The development of competency-based scoring algorithms requires three steps. First, Hogan aligned the competencies provided by the client with competencies in the HCM. To align the two competency models, clear competency definitions are necessary. For this project, we relied on information provided by the client to define each competency and illustrate the behaviors associated with each component. The HRD then used their expert knowledge of competencies and job performance to map the client's competencies to the HCM. Hogan researchers met to reach 100% agreement. Table 3 displays the alignment of the Hogan and the client's competency models.

Table 3 HCM Mapping to Client Competencies

Client Competencies	**Hogan Competency**
Conflict Management	Managing Conflict
Consistency/Dependability	Dependability
Planning and Organizing	Planning and Organizing
Coaching and Developing Others	Developing People
Change Mastery	Driving Change
Formal Communications (Public Speaking)	Presenting to Others
Brand Understanding	Industry Insight

The second step entails identifying normal personality facets that relate both theoretically and empirically to each competency. For this project, we selected HPI HICs that were (a) theoretically related to the client competencies and (b) predictive of job performance. We identified theoretical relationships based on the expert judgment of HRD members' with extensive knowledge of the HPI HICS and their relationships with performance. We identified predictive relationships by examining correlations between each assessment HIC and job performance ratings across multiple archival studies. These studies originate in the Hogan archive, which contains information from over 800 research studies conducted from 1981 to the present and provides a means to identify the best predictors of each competency in the HCM. Foster, Lemming, and Johnson (2010) mapped each of the criteria from over 250

criterion-related validity studies in the Hogan archive onto the Hogan competencies and conducted a meta-analysis for each HIC/scale-by-competency relationship. These meta-analyses provide stable estimates of the relationships between the HPI HICs and the client competencies.

The final step involves examining multiple algorithms for each competency to identify the specific combination of HPI HICs that maximizes prediction using theoretically aligned HPI HICs. Algorithms were initially constructed using six HPI HICs. The number of HPI HICs varied slightly when including an additional HPI HIC improved the prediction significantly. Conversely, fewer HPI HICS were included when additional items did not improve prediction. We used regression analyses to identify the percentage of variance accounted for by HPI HICs identified in the first two steps using a dataset that contains assessment and job performance data for over 13,000 individuals. These data represent a range of jobs, organizations, and industries. Although the number of cases for any one analysis varies based on available assessment and performance data, this dataset provides a means for evaluating the predictive validity of most algorithms using hundreds of cases from multiple studies. This not only helps ensure the results are stable, but also maximizes the likelihood that they will generalize to future samples.

To evaluate each algorithm, we conducted two separate regression analyses -- the first using the algorithms comprised of selected HPI HICs and the second using all of the HPI HICs. We examined both sets of results to determine (a) if the selected HPI HICs were predicting as expected, and (b) if there were additional predictors that should be added to the algorithm. Consequently, we selected the final HPI HICs based on (a) theory (b) aggregated correlations from several prior studies (c) and regression results. Again, this use of multiple methods for identifying predictive assessment HPI HICs helps maximize prediction and generalizability of results to future samples.

Table 4 displays the HPI HICs comprising each competency-based algorithm.

Table 4 HPI-Based Predictive Algorithms

Client Competency	**HPI-based Algorithm**	***N***	***r***
Conflict Management	Not Anxious + No Depression + Virtuous + Not Autonomous + Impulse Control + Avoids Trouble	2,198	.10
Consistency/Dependability	Easy To Live With – Experience Seeking + Not Autonomous + Avoids Trouble – Thrill Seeking	3,770	.12
Planning and Organizing	Not Anxious + Competitive + Leadership – Like Parties + Not Spontaneous + Science Ability	4,022	.11
Coaching and Developing Others	Self Confidence + Leadership + Virtuous + Caring	2,717	.14
Change Mastery	Even Tempered + Leadership + No Social Anxiety + Virtuous + No Guilt	244	.21
Formal Communications (Public Speaking)	Not Anxious + Leadership + Likes People + Not Autonomous – Impulse Control + Good Memory	278	.29
Brand Understanding	Even Tempered – Experience Seeking + Generates Ideas + Calmness + Self Confidence	2,025	.09

Note. N = Sample size; *r* = zero order correlation.

Applications and Recommendations

The building blocks for the previously-described research included (a) HIC-level HPI data, and (b) job performance data residing in the Hogan archive. We used research involving the preceding variables to develop HPI-based scoring algorithms capable of predicting performance as defined in terms of each respective performance competency (i.e., we specified the personality facets related to competency-based performance criteria). The algorithms presented in this report can be used to inform candidate-screening efforts and will enable clients to provide insightful feedback to candidates regarding how others' likely appraise their performance, as defined in terms of the client's competencies.

Pass Rate Analysis

Hogan evaluated the performance of the HPI-based competency-specific scoring algorithms by applying the algorithms to a specific HPI archival sample. Using HIC-level data in this archive subsample, cutoff scores were set to place individuals into one of three categories (Low Fit, Moderate Fit, and Strong Fit). These "fit rate" analyses serve only as estimates in lieu of applicant data available directly from the client. As shown in Table 5, the recommended HPI-based algorithms effectively distribute this sample across levels of fit. We recommend that the client monitor pass rates resulting from operational use of the recommended HPI-based algorithms once an adequate number of cases are available.

Table 5 Expected Pass Rates for Competency Algorithms in an Archival Sample

Competency	**Low Fit**	**Moderate Fit**	**High Fit**
Conflict Management	29.8%	37.1%	33.1%
Consistency/Dependability	30.1%	36.9%	33.0%
Planning and Organizing	30.2%	36.1%	33.7%
Coaching and Developing Others	30.4%	36.6%	33.0%
Change Mastery	31.9%	32.9%	35.2%
Formal Communications (Public Speaking)	33.5%	29.3%	37.2%
Brand Understanding	31.7%	35.3%	33.0%

Simulated Adverse Impact

Hogan evaluated potential selection rates for the various gender, age, and ethnic groups using an HPI archival sample (*N* = 156,614). These analyses serve only as estimates of potential selection rates in lieu of actual applicant data. A number of non-test factors, most notably the opportunity to take the assessment, affect selection rates. Tables 4.5 - 4.11 show the "fit" designation rates for each HPI-based competency-specific algorithm within the HPI archival sample by demographic group, where males, Caucasians, and applicants under 40 years of age

serve as majority groups. Based on the 80% rule-of-thumb (or the "four-fifths rule" described in the Uniform Guidelines), these findings suggest any single HPI-based competency-specific algorithm should not result in adverse impact against any group. The client should actively monitor the impact of the recommended HPI-based competency-specific algorithms to ensure no adverse impact is seen at the competency level.

Table 6 Results Associated with Applying HPI-Based Conflict Management Competency Algorithm to Simulated Applicant Pool

		Fails to Meet Minimum Cutoff Scores		Meets Minimum Cutoff Scores		A.I. Ratio
		N	%	N	%	
Total		58,314	37.2%	98,300	62.8%	
	Male	20,002	32.9%	40,720	67.1%	
	Female	25,173	41.5%	35,557	58.5%	No A.I.
	Under 40	15,745	36.9%	26,934	63.1%	
	40 and Over	8,801	48.3%	9,412	51.7%	No A.I.
	Black or African American	4,565	35.1%	8,441	64.9%	No A.I.
	Hispanic or Latino	5,656	37.6%	9,378	62.4%	No A.I.
	Asian American/P.I.	2,111	41.7%	2,956	58.3	No A.I.
	American Indian/A.N.	854	38.7%	1,354	61.3%	No A.I.
	White/Caucasian	26,737	36.6%	46,238	63.4%	

Note. N = Sample Size; % = Percentage of Sample; A.I. = Adverse Impact.

Table 7 Results Associated with Applying HPI-Based Consistency/Dependability Competency Algorithm to Simulated Applicant Pool

		Fails to Meet Minimum Cutoff Scores		Meets Minimum Cutoff Scores		A.I. Ratio
		N	%	N	%	
Total		50,038	31.9%	106,576	68.1%	
	Male	19,419	32.0%	41,303	68.0%	
	Female	19,974	32.9%	40,756	67.1%	No A.I.
	Under 40	14,280	33.5%	28,399	66.5%	
	40 and Over	5,953	32.7%	12,260	67.3%	No A.I.
	Black or African American	3,975	30.6%	9,031	69.4%	No A.I.
	Hispanic or Latino	4,725	31.4%	10,309	68.6%	No A.I.
	Asian American/P.I.	247	44.3%	2,820	55.7%	No A.I.
	American Indian/A.N.	818	37.0%	1,390	63.0%	No A.I.
	White/Caucasian	22,820	31.3%	50,155	68.7%	

Note. N = Sample Size; % = Percentage of Sample; A.I. = Adverse Impact.

Table 8 Results Associated with Applying HPI-Based Planning and Organizing Competency Algorithm to Simulated Applicant Pool

		Fails to Meet Minimum Cutoff Scores		Meets Minimum Cutoff Scores		A.I. Ratio
		N	%	N	%	
Total		56,021	35.8%	100,593	64.2%	
	Male	19,240	31.7%	41,482	68.3%	
	Female	24,062	39.6%	36,668	60.4%	No A.I.
	Under 40	14,919	35.0%	27,760	65.0%	
	40 and Over	8,485	46.6%	9,728	53.4%	No A.I.
	Black or African American	4,459	34.3%	8,547	65.7%	No A.I.
	Hispanic or Latino	5,270	35.1%	9,764	64.9%	No A.I.
	Asian American/P.I.	1,942	38.3%	3,125	61.7%	No A.I.
	American Indian/A.N.	846	38.3%	1,362	61.7%	No A.I.
	White/Caucasian	25,788	35.3%	47,187	64.7%	

Note. N = Sample Size; % = Percentage of Sample; A.I. = Adverse Impact.

Table 9 Results Associated with Applying HPI-Based Coaching and Developing Others Competency Algorithm to Simulated Applicant Pool

		Fails to Meet Minimum Cutoff Scores		Meets Minimum Cutoff Scores		A.I. Ratio
		N	%	N	%	
Total		35,445	22.6%	121,169	77.4%	
	Male	11,915	19.6%	48,807	80.4%	
	Female	15,070	24.8%	45,660	75.2%	No A.I.
	Under 40	9,599	22.5%	33,080	77.5%	
	40 and Over	4,944	27.1%	13,269	72.9%	No A.I.
	Black or African American	2,498	19.2%	10,508	80.8%	No A.I.
	Hispanic or Latino	3,243	21.6%	11,791	78.4%	No A.I.
	Asian American/P.I.	1,059	20.9%	4,008	79.1%	No A.I.
	American Indian/A.N.	472	21.4%	1,736	78.6%	No A.I.
	White/Caucasian	16,188	22.2%	56,787	77.8%	

Note. N = Sample Size; % = Percentage of Sample; A.I. = Adverse Impact.

Table 10 Results Associated with Applying HPI-Based Change Mastery Competency Algorithm to Simulated Applicant Pool

		Fails to Meet Minimum Cutoff Scores		Meets Minimum Cutoff Scores		A.I. Ratio
		N	%	N	%	
Total		40,068	25.6%	116,546	74.4%	
	Male	17,985	29.6%	42,737	70.4%	
	Female	13,058	21.5%	47,672	78.5%	No A.I.
	Under 40	12,141	18.4%	30,538	71.6%	
	40 and Over	4,499	24.7%	13,714	75.3%	No A.I.
	Black or African American	2,753	21.2%	10,253	78.8%	No A.I.
	Hispanic or Latino	3,333	22.2%	11,701	77.8%	No A.I.
	Asian American/P.I.	1,713	33.8%	3,354	66.2%	No A.I.
	American Indian/A.N.	680	30.8%	1,528	69.2%	No A.I.
	White/Caucasian	18,531	25.4%	54,444	74.6%	

Note. N = Sample Size; % = Percentage of Sample; A.I. = Adverse Impact.

Table 11 Results Associated with Applying HPI-Based Formal Communications Competency Algorithm to Simulated Applicant Pool

		Fails to Meet Minimum Cutoff Scores		Meets Minimum Cutoff Scores		A.I. Ratio
		N	%	N	%	
Total		56,021	35.8%	100,593	64.2%	
	Male	19,240	31.7%	41,482	68.3%	
	Female	24,062	39.6%	36,668	60.4%	No A.I.
	Under 40	14,919	35.0%	27,760	65.0%	
	40 and Over	8,485	46.6%	9,728	53.4%	No A.I.
	Black or African American	4,459	34.3%	8,547	65.7%	No A.I.
	Hispanic or Latino	5,270	35.1%	9,764	64.9%	No A.I.
	Asian American/P.I.	1,942	38.3%	3,125	61.7%	No A.I.
	American Indian/A.N.	846	38.3%	1,362	61.7%	No A.I.
	White/Caucasian	25,788	35.3%	47,187	64.7%	

Note. N = Sample Size; % = Percentage of Sample; A.I. = Adverse Impact.

Table 12 Results Associated with Applying HPI-Based Brand Understanding Competency Algorithm to Simulated Applicant Pool

		Fails to Meet Minimum Cutoff Scores		Meets Minimum Cutoff Scores		A.I. Ratio
		N	%	N	%	
Total		58,314	37.2%	98,300	62.8%	
	Male	20,002	32.9%	40,720	67.1%	
	Female	25,173	41.5%	35,557	58.5%	No A.I.
	Under 40	15,745	36.9%	26,934	63.1%	
	40 and Over	8,801	48.3%	9,412	51.7%	No A.I.
	Black or African American	4,565	35.1%	8,441	64.9%	No A.I.
	Hispanic or Latino	5,656	37.6%	9,378	62.4%	No A.I.
	Asian American/P.I.	2,111	41.7%	2,956	58.3%	No A.I.
	American Indian/A.N.	854	38.7%	1,354	61.3%	No A.I.
	White/Caucasian	26,737	36.6%	46,238	63.4%	

Note. N = Sample Size; % = Percentage of Sample; A.I. = Adverse Impact.

Uses and Applications

Hogan suggests that the client use the results of the recommended HPI-based scoring algorithms to help inform their overall process for screening and selecting candidates into the target job. By administering the HPI and using assessment scores to determine readiness as defined in terms of each competency, the client should be able to maximize applicants' readiness for the target job. The following procedures will help the client use and monitor performance of the recommended algorithms. First, pass rates require monitoring to determine if the recommended algorithms allow enough applicants to pass at high levels while accurately identifying other applicants who are less ready for the target job. Second, the client should maintain records of scores by demographic group, as indicated by best practices, to monitor the possibility of adverse impact resulting from the use of these competency-based algorithms. Finally, performance appraisal and/or monitoring data should be maintained, if possible, on incumbents scored using these algorithms. These data provide a check on the validity of the formulas and help determine utility.

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Appendix A: Academic and Company Competency Models

Model	Reference	Model Type
Borman & Brush	Borman, W. C., & Brush, D. H. (1993). More progress toward a taxonomy of managerial performance requirements. *Human Performance, 6*, 1-21.	Academic
Campbell, McCloy, Oppler, & Sager	Campbell, J. P., McCloy, R. A., Oppler, S. H., & Sager, C.E. (1993). A theory of performance. In N. Schmitt & W. C. Borman (Eds.), *Personnel selection in organization* (pp. 35-70). San Francisco, CA: Jossey-Bass.	Academic
Flanagan	Flanagan, J. C. (1951). Defining the requirements of the executive's job. *Personnel Psychology, 28*, 28-35	Academic
Hemphill	Hemphill, J. K. (1959). Job descriptions for executives. *Harvard Business Review, 37*, 55-67.	Academic
Katzell	Katzell, R. A., Barret, R. S., Vann, D. H., & Hogan, J. M. (1968). Organizational correlates of executives roles. *Journal of Applied Psychology, 52*, 22-28.	Academic
Luthans & Lockwood	Luthans, F., & Lockwood, D. L. (1984). Toward an observation system for measuring leader behavior in natural settings. In J. G. Hunt, D. Hosking, C. Schriesheim, & R. Stewart (Eds.), *Leaders and managers: International perspectives on managerial behavior and leadership* (pp. 117-141). New York, NY: Pergamon Press.	Academic
Morse & Wagner	Morse, J. J., & Wagner, F. R. (1978). Measuring the process of managerial effectiveness. *Academy of Management Journal, 21*, 23-35.	Academic
Prien	Prien, E. P. (1963). Development of a supervisor description questionnaire. *Journal of Applied Psychology, 47,* 10-14.	Academic
Tett, Guterman, Bleier, & Murphy	Tett, R. P., Guterman, H. A., Bleier, A., & Murphy, P. J. (2000). Development and content validation of a "hyperdimensional" taxonomy of managerial competence. *Human Performance, 12*(3), 205-251.	Academic
Tornow & Pinto	Tornow, W. W. & Pinto, P. R. (1976). The development of a managerial job taxonomy: A system for describing, classifying, and evaluating executive positions. *Journal of Applied Psychology, 61*, 410-418.	Academic
Woffard	Woffard, J. C. (1970). Factor analysis of managerial behavior variables. *Journal of Applied Psychology, 54*, 169-173.	Academic
Yukl & Lepsinger	Yukl, G. A., & Lepsinger, R. (1992). An integrating taxonomy of manager behavior: Implications for improving managerial effectiveness. In J. W. Jones, B. D. Steffy, D. W. Bray (Eds.), *Applying psychology in business: The manager's handbook* (pp. 563-573). Lexington, MA: Lexington Books.	Academic

Appendix A: Academic and Company Competency Models (continued)

Model	Reference	Model Type
Bigby Havis	https://www.bigby.com/systems/assessv2/admin/whitepaper.htm	Commercial
Jeanneret & Associates	Tett, R. P., Guterman, H. A., Bleier, A., & Murphy, P. J. (2000). Development and content validation of a "hyperdimensional" taxonomy of managerial competence. *Human Performance, 12*(3), 205-251.	Commercial
Lominger	Lombardo, M. M. & Eichinger, R. W. (2002). The leadership machine (3rd ed.). Minneapolis, MN: Lominger Limited Inc. Lombardo, M. M. & Eichinger, R. W. (2003). FYI: For your improvement (3rd ed.). Minneapolis, MN: Lominger Limited Inc.	Commercial
PDI	Tett, R. P., Guterman, H. A., Bleier, A., & Murphy, P. J. (2000). Development and content validation of a "hyperdimensional" taxonomy of managerial competence. *Human Performance, 12*(3), 205-251.	Commercial
Select International	Internal Company Source	Commercial
SHL	Bartram, D. (2005). The great eight competencies: A criterion-centric approach to validation. *Journal of Applied Psychology, 90*(6), 1185-1203.	Commercial
Career One Stop (U.S. Department of Labor-sponsored Web site)	www.careeronestop.org	Governmental
O*NET	www.onetcenter.org	Governmental
Office of Personnel Management	www.opm.com	Governmental

Appendix B: Hogan Competency Model

Competency Number	Competency	Definition	Domain
1	Accountability	Accepts responsibility for one's actions regardless of outcomes.	Intrapersonal
2	Anticipating Problems	Forecasts and detects errors, gaps, and potential flaws.	Business
3	Attracting Talent	Recruits, rewards, and retains individuals with needed skills and abilities.	Leadership
4	Business Insight	Applies business knowledge to achieve organizational goals and objectives.	Leadership
5	Caring about People	Displays sensitivity towards the attitudes, feelings, or circumstances of others.	Intrapersonal
6	Competing with Others	Strives to exceed others' performance.	Intrapersonal
7	Customer Focus	Provides courteous, timely, and helpful service to encourage client loyalty.	Interpersonal
8	Dealing with Ambiguity	Comfortably handles unclear or unpredictable situations.	Intrapersonal
9	Decision Making	Uses sound judgment to make timely and effective decisions.	Leadership
10	Delegating	Assigns work to others based on tasks, skills, and workloads.	Leadership
11	Dependability	Performs work in a reliable, consistent, and timely manner.	Intrapersonal
12	Detail Focus	Performs work with care, accuracy, and attention to detail.	Intrapersonal
13	Developing People	Provides support, coaching, training, and career direction to others.	Leadership
14	Displaying Confidence	Projects poise and self-assurance when completing work tasks.	Intrapersonal
15	Driving Change	Champions new methods, systems, and processes to improve performance.	Leadership
16	Driving for Results	Accomplishes goals, completes tasks, and achieves results.	Intrapersonal
17	Driving Innovation	Stimulates creative ideas and perspectives that add value.	Business
18	Driving Performance	Provides guidance and feedback to maximize performance of individuals and/or groups.	Leadership
19	Driving Strategy	Directs effort to achieve long-term business objectives.	Leadership
20	Engagement	Demonstrates loyalty and commitment through enthusiasm and extra effort.	Interpersonal
21	Financial Insight	Applies financial knowledge to achieve organizational goals and objectives.	Business
22	Flexibility	Changes direction as appropriate based on new ideas, approaches, and strategies.	Intrapersonal
23	Handling Stress	Manages pressure without getting upset, moody, or anxious.	Intrapersonal

Appendix B: Hogan Competency Model (continued)

Competency Number	Competency	Definition	Domain
24	Industry Insight	Applies knowledge of industry trends and outlooks to achieve organizational goals and objectives.	Business
25	Influencing Others	Persuades others to help achieve organizational goals and objectives.	Interpersonal
26	Inspiring Others	Motivates others to accomplish organizational goals.	Leadership
27	Integrity	Acts honestly in accordance with moral or ethical principles.	Intrapersonal
28	Leading Others	Demonstrates general leadership ability and effectiveness.	Leadership
29	Leveraging Diversity	Respects and values individual differences to obtain a desired effect or result.	Interpersonal
30	Leveraging People Skills	Gets along well with others, is tactful, and behaves appropriately in social situations.	Interpersonal
31	Leveraging Work Skills	Applies technology and job-relevant abilities to complete work tasks.	Business
32	Listening to Others	Listens and restates the ideas and opinions of others to improve mutual understanding.	Interpersonal
33	Managing Conflict	Resolves hostilities and disagreements between others.	Leadership
34	Managing Resources	Coordinates people and financial and material capital to maximize efficiency and performance.	Leadership
35	Negotiating	Explores alternatives to reach outcomes acceptable to all parties.	Interpersonal
36	Networking	Builds and maintains a system of strategic business connections.	Interpersonal
37	Organizational Citizenship	Exceeds job requirements to help the organization.	Interpersonal
38	Overcoming Obstacles	Pursues goals and strategies despite discouragement or opposition.	Intrapersonal
39	Planning and Organizing	Coordinates and directs activities to help achieve business objectives.	Intrapersonal
40	Political Savvy	Recognizes, interprets, and works within the political environment of an organization.	Business
41	Positive Attitude	Displays a positive disposition towards work.	Intrapersonal
42	Presenting to Others	Conveys ideas and information to groups.	Business
43	Processing Information	Gathers, organizes, and analyzes diverse sources of information.	Business
44	Professionalism	Acts in accordance with job-related values, principles, and standards.	Intrapersonal
45	Quality Focus	Strives to meet quality standards and produce quality work products.	Business
46	Relationship Building	Develops collaborative relationships to facilitate current and future objectives.	Interpersonal
47	Rule Compliance	Adheres to directions, policies, and/or legal guidelines.	Intrapersonal

Appendix B: Hogan Competency Model (continued)

Competency Number	Competency	Definition	Domain
48	Safety Focus	Attends to precautions and proper procedures to guard against work-related accidents and injuries.	Business
49	Sales Focus	Generates revenue by promoting products and services to others.	Business
50	Self Development	Actively acquires new knowledge and skills to remain current with and/or grow beyond job requirements.	Intrapersonal
51	Self Management	Demonstrates appropriate motivation, attitude, and self-control.	Intrapersonal
52	Setting Goals	Identifies short-term objectives and steps to achieve them.	Business
53	Solving Problems	Identifies solutions given available information.	Business
54	Staying Alert	Remains focused when performing monotonous tasks.	Intrapersonal
55	Taking Initiative	Takes action without needing direction from others.	Intrapersonal
56	Taking Smart Risks	Evaluates tradeoffs between potential costs and benefits and acts accordingly.	Intrapersonal
57	Team Building	Assembles productive groups based upon required skills, goals and tasks.	Leadership
58	Teamwork	Collaborates with others to achieve goals.	Interpersonal
59	Time Management	Plans and prioritizes work to maximize efficiency and minimize downtime.	Intrapersonal
60	Verbal Communication	Expresses ideas and opinions effectively in spoken conversations.	Interpersonal
61	Working Hard	Consistently strives to complete tasks and assignments at work.	Intrapersonal
62	Written Communication	Expresses ideas and opinions effectively in writing.	Business

Appendix C: Crosswalk from 56-CET to 62 HCM

56 item CET	62 item CET
Achievement Orientation (modified definition)	Driving for Results
Verbal Direction (similar to)	Listening to Others
NEW	Dealing with Ambiguity
Build Strategic Work Relationships/Building Partnerships	Relationship Building
Building Teams (modified definition)	Team Building
NEW	Business Insight
NEW	Caring about People
Citizenship (completely new and different definition)	Organizational Citizenship
NEW	Competing with Others
Decision Making/Judgment (modified definition)	Decision Making
Delegation (modified definition)	Delegating
Dependability	Dependability
Detail Orientation (modified definition)	Detail Focus
Employee Development/Teaching Others (combined and modified definition)	Developing People
NEW	Financial Insight
Flexibility/Adaptability (modified definition)	Flexibility
NEW/verbal direction (modified)	Rule Compliance
NEW	Setting Goals
Industry Knowledge (modified definition)	Industry Insight
Influence/Gaining Commitment/Impact (completely new and different definition)	Influencing Others
NEW	Processing Information
Initiative	Taking Initiative
Innovation (completely new definition)	Driving Innovation
Interpersonal Skills	Leveraging People Skills
NEW	Self Management
Leadership/Meeting Leadership (modified definition)	Leading Others
Facilitating Change (completely new and different definition)	Driving Change
Conflict Resolution (modified definition)	Managing Conflict
Follow-Up (completely new and different definition)	Driving Performance
NEW	Inspiring Others
Negotiation	Negotiating
Oral Communication/Meeting Participation (modified definition)	Verbal Communication
Organizational Commitment	Engagement
NEW	Overcoming Obstacles
Planning/Organizing (new definition)	Planning and Organizing
NEW	Political Savvy
Formal Presentation (modified definition)	Presenting to Others

Appendix C: Crosswalk from 56-CET to 62 HCM (continued)

56 item CET	62 item CET
Problem Solving (modified definition)	Anticipating Problems
Problem Solving (modified definition)	Solving Problems
NEW	Professionalism
NEW	Quality Focus
Management Performance (definition modified)	Managing Resources
NEW	Accountability
Risk Taking	Taking Smart Risks
Safety	Safety Focus
Sales Ability, Facilitative Sales, Consultative Sales (all combined and modified definition)	Sales Focus
NEW	Displaying Confidence
Continuous Learning (modified definition)	Self Development
Customer Service (modified definition)	Customer Focus
NEW	Networking
Strategic Vision (new definition)	Driving Strategy
Stress Tolerance	Handling Stress
NEW	Attracting Talent
Teamwork (new definition)	Teamwork
Planning/Organizing (modified name)	Time Management
Trustworthiness/Integrity (combined/modified definition)	Integrity
NEW	Leveraging Diversity
Vigilance/Data Entry	Staying Alert
Work Attitude	Positive Attitude
NEW	Working Hard
Job Knowledge	Leveraging Work Skills
Written Communication/Meeting Participation	Written Communication
Technical Knowledge	Not Included
Math Skills	Not Included
Training Performance	Not Included
Information Monitoring	Not Included

Appendix D: HPI Description and Development

HPI Test Description

- 206 true/false items with no psychiatric content
- 7 personality scales, 1 validity scale, no item overlap
- 4th grade reading level
- 15-20 minute completion time
- Items carefully screened to minimize invasion of privacy
- Designed for ages 18 and above
- Designed for use in personnel selection and development
- Internet administration and reporting

HPI Development

- Based on the FFM, development of the HPI began in the late 1970s, with construction and validation conducted in accordance with professional standards and the *Uniform Guidelines*. In terms of instrument development, an initial pool of 425 items was refined using factor analysis and empirical validation procedures to assign 206 items to seven construct scales.

- Favorable reviews of the HPI appear in the Buros Institute of Mental Measurements, the 13th edition of the Mental Measurements Yearbook (Lobello, 1998), and the British Psychological Society Psychological Testing Centre Test Reviews (Creed & Shackleton, 2007; Marshall & Lindley, 2009).

- Norms based on over 150,000 working adults and job applicants from a variety of industry sectors including healthcare, military services, transportation, protective services, retail, manufacturing, and hospitality. This sample is representative of 14 of the 22 U.S. Department of Labor occupational categories.

- The HPI has been used in over 200 validation studies to predict occupational performance across jobs and industries. Jobs studied represent 95% of the industry coverage of the Dictionary of Occupational Titles (U.S. Department of Labor, 1991).

- Meta-analyses of HPI scales indicate that the estimated true scale validities for predicting job performance are as follows: Adjustment (.43), Ambition (.35), Interpersonal Sensitivity (.34), Prudence (.36), Inquisitive (.34), and Learning Approach (.25). These peer-reviewed results appear in the *Journal of Applied Psychology* (J. Hogan & Holland, 2003).

- Research, to date, indicates no adverse impact on racial/ethnic, gender, or age groups.

- The HPI incorporates the FFM with an internal factor structure supporting seven scales. The test-retest reliabilities range from .69 to .87. The 2007 *Hogan Personality Inventory Manual* (3rd edition) documents the background, development, and psychometric properties of the inventory.

- Overall, HPI scales demonstrate adequate psychometric qualities (Lobello, 1998). Items retained in the final battery predict significant non-test behavior. Empirical validation research conducted over the last 20 years provides a firm understanding of construct validity and the nature and range of job performance prediction. Overall, the HPI is a well-validated instrument that predicts job performance across occupations and organizations (Axford, 1998; J. Hogan & Holland, 2003).

Constructs Measured

The HPI scales (and associated FFM constructs measured) are defined as follows:

Adjustment concerns the degree to which a person is steady in the face of pressure, or conversely, moody and self-critical (FFM: Emotional Stability).

Ambition concerns the degree to which a person seems leaderlike, status-seeking, and achievement-oriented (FFM: Extraversion).

Sociability concerns the degree to which a person needs and/or enjoys social interaction (FFM: Extraversion).

Interpersonal Sensitivity concerns the degree to which a person has social sensitivity, tact, and perceptiveness (FFM: Agreeableness).

Prudence concerns the degree to which a person seems conforming, dependable and has self-control (FFM: Conscientiousness).

Inquisitive concerns the degree to which a person seems imaginative, adventurous, and analytical (FFM: Intellect/Openness).

Learning Approach concerns the degree to which a person enjoys academic activities and values education as an end in itself (FFM: Intellect/Openness).

Appendix E: HIC Descriptions and Sample Items

During the development of the HPI, it appeared that each scale could be broken down into a set of related themes. Because the items comprising subscales measuring these themes clustered together, due to predicted variance in performance focused around a specific behavior, they were named Homogenous Item Composites (Zonderman, 1980), or HICs. For each HPI scale, the items comprising each HIC form small facets that represent themes within the larger construct. The number of these "facets" varies depending on the scale, ranging from four (Learning Approach) to eight (Adjustment).

In the spring of 1992, Hogan conducted factor analyses on the HIC correlation matrix. Analyses indicated that eight factors underlie the matrix, forming the basis of the HPI scales. Because a few HICs had substantial loadings on two factors, this information was used to balance the number of items on each scale by assigning HICs accordingly. A total of 44 HICs comprise the current version of the HPI, with no overlap between items, HICs, and scales. The table below presents the HPI scales, HICs underlying each scale, and descriptions and sample items for each HIC.

HPI scales, HICs, Descriptions, and Sample Items

HPI Scale	**Description**	**Sample Item**
Adjustment		
• Empathy	Concern for others	I dislike criticizing people, even when they need it
• Not Anxious	Absence of worry	Deadlines don't bother me
• No Guilt	Absence of regret	I rarely feel guilty about the things I have done
• Calmness	Not volatile	I keep calm in a crisis
• Even Tempered	Patience	I hate to be interrupted
• No Complaints	Complacence	I almost never receive bad service
• Trusting	Belief in others	People really care about one another
• Good Attachment	Good relations with authority	In school, teachers liked me
Ambition		
• Competitive	Desire to win	I want to be a success in life
• Self Confidence	Self-assurance	I expect to succeed at everything
• Accomplishment	Personal effectiveness	I am known as someone who gets things done
• Leadership	Leadership tendencies	In a group I like to take charge of things
• Identity	Satisfaction with one's life	I know what I want to be
• No Social Anxiety	Social self-confidence	I don't mind talking in front of a group of people

Appendix E: HIC Descriptions and Sample Items (continued)

HPI Scale	Description	Sample Item
Sociability		
• Likes Parties	Affability	I would go to a party every night if I could
• Likes Crowds	Affiliativeness	Being part of a large crowd is exciting
• Experience Seeking	Needs variety	I like a lot of variety in my life
• Exhibitionistic	Showing off	I like to be the center of attention
• Entertaining	Being witty and engaging	I am often the life of the party
Interpersonal Sensitivity		
• Easy to Live With	Being easygoing	I work well with other people
• Sensitive	Being considerate	I always try to see the other person's point of view
• Caring	Social Sensitivity	I am sensitive to other people's moods
• Likes People	Companionable	I enjoy just being with other people
• No Hostility	Tolerant	I would rather not criticize people
Prudence		
• Moralistic	Self-righteousness	I always practice what I preach
• Mastery	Diligent	I do my job as well as I can
• Virtuous	Perfectionism	I strive for perfection in everything I do
• Not Autonomous	Conformity	Other people's opinions of me are important
• Not Spontaneous	Planful	I always know what I will do tomorrow
• Impulse Control	Self-disciplined	I rarely do things on impulse
• Avoids Trouble	Professed probity	When I was in school, I rarely gave the teachers any trouble
Inquisitive		
• Science	Analytical	I am interested in science
• Curiosity	Investigative	I have taken things apart just to see how they work
• Thrill Seeking	Stimulus seeking	I would like to be a race car driver
• Intellectual Games	Playful cognition	I enjoy solving riddles
• Generates Ideas	Ideational fluency	I am known for having good ideas
• Culture	Cultural interests	I like classical music

Appendix E: HIC Descriptions and Sample Items (continued)

HPI Scale	Description	Sample Item
Learning Approach		
• Good Memory	Powers of recall	I have a large vocabulary
• Education	Academic talent	As a child, school was easy for me
• Math Ability	Numerical talent	I can multiple large numbers quickly
• Reading	Verbal talent	I would rather read than watch TV
Other		
• Self Focus	Introspection	I often think about the reasons for my actions
• Impression Management	Reputation control	I often wonder what other people are thinking of me
• Appearance	Public self-consciousness	My success depends on how others perceive me