Hire★Vue

WHITE PAPER

ASSESSMENTS OVERVIEW AND IMPLEMENTATION

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With HireVue's next generation of pre-hire assessments, we have elevated the assessment process beyond legacy or traditional assessments with new delivery methodologies (e.g., games) and novel Artificial Intelligence (AI)-based scoring procedures. HireVue Assessments measure a candidate's critical competencies faster, while improving diversity in selection decisions. Our approach enhances candidate engagement and experience throughout the assessment process. Thus, our cutting-edge research[1] drives the development of next-generation assessments which can robustly, rapidly, and accurately identify the best candidates and help organizations meet their business objectives in a fair and legally-defensible way.

Modeled upon traditional structured interview best practices, HireVue interview assessments use unique patterns of how individuals communicate, the actual content of their message, and their communication patterns exhibited during the interview process Interview data is coupled with data collected from gameplay to provide key insights into a candidate's personality and work style, how they communicate and interact with others, and their ability to effectively leverage information to generate solutions and solve problems.

HireVue's Assessments integrate more than 100 years of research from the field of Industrial-Organizational (IO) Psychology (a well established, scientific field that studies human behavior in organizations and the workplace)[2] with modern applications of digital technology and AI.[3] More specifically, HireVue uses machine learning algorithms to evaluate candidates based on objective data that is statistically linked to important work-related competencies and measures of individual job performance. These insights help human evaluators more effectively prioritize their time and attention to focus on high potential candidates while reducing human evaluator bias typical in traditional evaluation processes that rely on subjective judgment.[4]

For additional detail on the measurement of the psychological behaviors and traits using HireVue assessments see White Paper *HireVue's Assessment Science*.[1]

In this paper, Hirevue's IO Psychologists and Data Scientists highlight the benefits of using AI-based assessments in the hiring process, and how to properly implement them within an enterprise talent solution. The design and implementation process of these modern and scientifically valid assessment technologies align with the professional Principles, and Guidelines set forth for testing principles within the employment context.[3,5]

Why Use Pre-Hire Assessments?

The key benefits that differentiate pre-hire assessments from other recruiting tools, such as resume screening, are scalability and validity. Objectivity in decision making is often compromised when you have multiple recruiters drawing on their unique experiences, perspectives, and intuitions in an attempt to make selection decisions at scale.

To say an employment selection system or tool supports valid selection decisions is to say that the selection system or tool reliably and consistently supports accurate inferences that relate to and predict valued job outcomes and behaviors (i.e., it demonstrates job relatedness).[3] Evidence should be available to answer:

✦ What are the essential job-related knowledge, skills, abilities, competencies, and behaviors critical to success on the job?

✦ How are these job-related behaviors or characteristics being measured? What tools (e.g., assessments) should be used?

✦ How are these measurement processes related to valued outcomes such as on-the-job performance, core competency behaviors, and fit in the job or company?

Ultimately, this evidence addresses this significant question,

DO DECISIONS BASED ON HIGHER SCORES ON THE ASSESSMENT RELATE TO VALUED OUTCOMES ON THE JOB?

This scientific approach to hiring means that selection decisions can be supported in a legally-defensible way, while driving more consistent, valued outcomes.

The Need for a Job Fit Framework

The world of work is more complex than ever before. Even jobs with lower level skill and experience requirements demand a unique combination of competencies to accurately assess for job fit. Interpersonal skills, communication skills, and cognitive and personality traits are all critical for success on the job.

Unfortunately, legacy pre-hire assessments do not allow for the comprehensive measurement of job-relevant competencies in an efficient way that is candidate friendly. In the 21st century we cannot expect candidates to spend one hour on an assessment, much less two or three. [6]
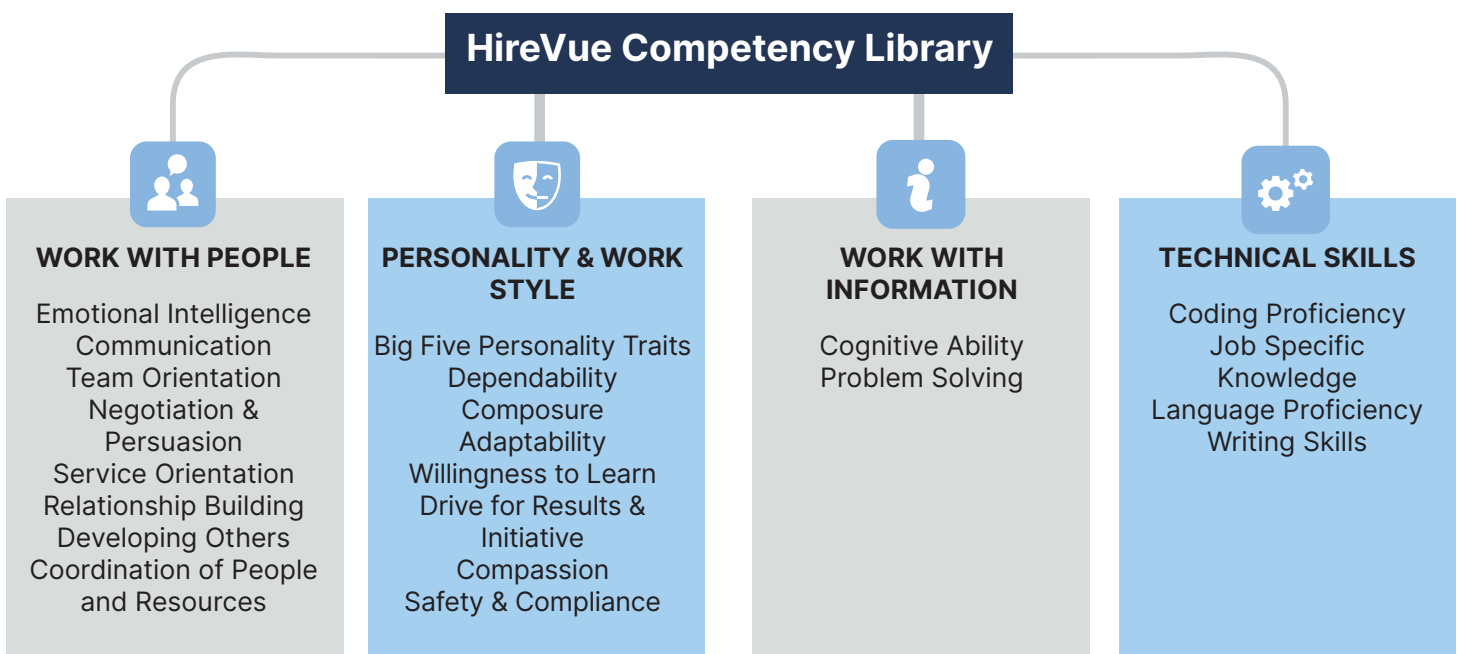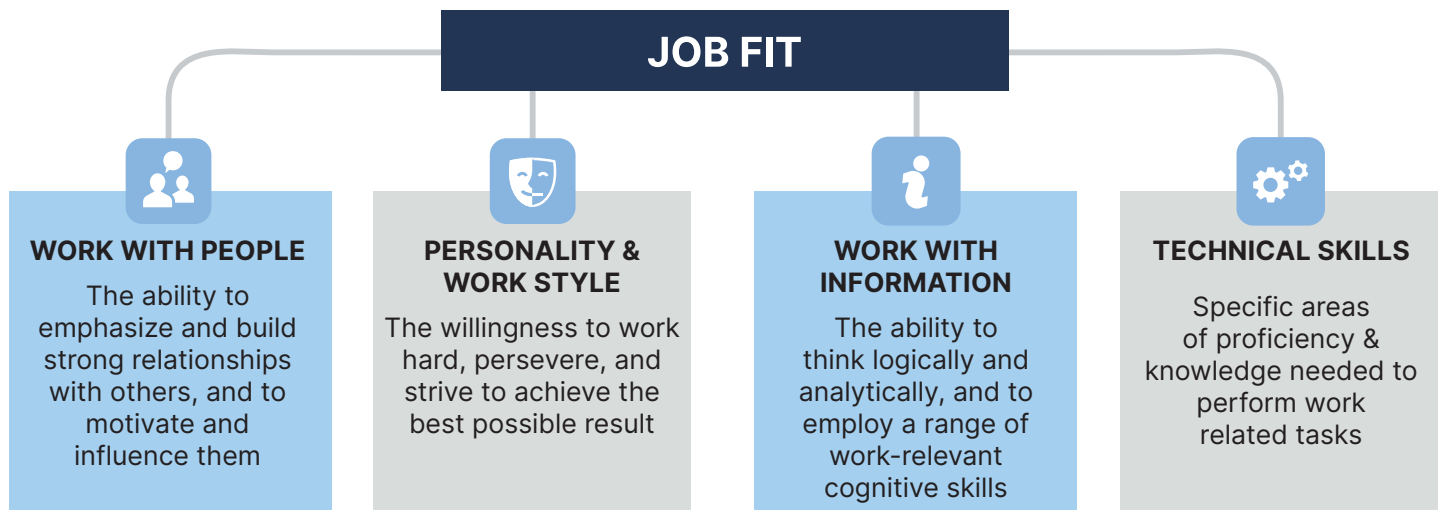
This is where today's technology, namely next-generation assessment techniques combined with artificial intelligence, comes into play. Blending 100 years of science-based best practices from IO Psychology with novel data science techniques like machine learning, we can finally move beyond the legacy tests and deliver assessments in an expedited candidate-friendly modality.

Rather than put a candidate through an hour or more of testing, we can evaluate a candidate's job fit—the optimal combination of personality traits, cognitive ability, and competency areas for a target set of job roles—in under 30 minutes.

Hirevue's Approach to Measuring Job Fit

HireVue's Job Fit Framework draws on research insights in the field of IO Psychology and how best to define jobs by measuring areas critical to job success.[7] The Framework categorizes the world of work into four factors - See Figure 1. Each factor can be further divided into critical competency areas that are important to success across jobs - See Figure 2. Additionally, HireVue has conducted a detailed content analysis study linking HireVue's Job Fit Competencies and almost 1,000 occupations in the U.S. Department of Labor/Employment and Training Administration's Occupational Information Network (O*NET).[8]

JOB FIT

WORK WITH PEOPLE
The ability to emphasize and build strong relationships with others, and to motivate and influence them

PERSONALITY & WORK STYLE
The willingness to work hard, persevere, and strive to achieve the best possible result

WORK WITH INFORMATION
The ability to think logically and analytically, and to employ a range of work-relevant cognitive skills

TECHNICAL SKILLS
Specific areas of proficiency & knowledge needed to perform work related tasks

HireVue Competency Library

WORK WITH PEOPLE

Emotional Intelligence
Communication
Team Orientation
Negotiation & Persuasion
Service Orientation
Relationship Building
Developing Others
Coordination of People and Resources

PERSONALITY & WORK STYLE

Big Five Personality Traits
Dependability
Composure
Adaptability
Willingness to Learn
Drive for Results & Initiative
Compassion
Safety & Compliance

WORK WITH INFORMATION

Cognitive Ability
Problem Solving

TECHNICAL SKILLS

Coding Proficiency
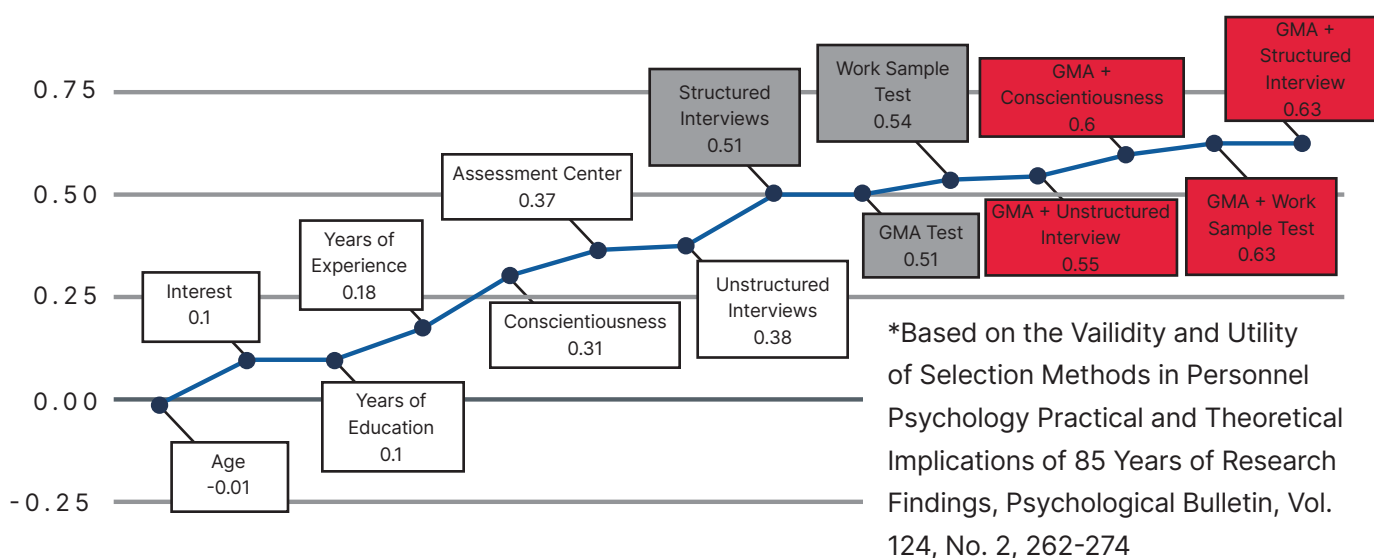Job Specific Knowledge
Language Proficiency
Writing Skills

Interview and Game-Based Assessments

A Meta Analysis project that synthesizes 100 years of selection science work has concretely established the best tools for selecting high quality applicants are General Mental Ability tests and Structured Interviews.[9] Additionally, the rapid pace at which jobs transform and new technology tools and systems constantly replace others, it is important to focus on broad abilities and personality traits that determine whether individuals can continuously learn and adapt. Thus, HireVue's assessment solution harnesses two advanced and complementary assessment delivery modalities: structured interviews and game-based assessments. Combined together, they provide a better prediction of job success than if they were administered alone. This approach ensures individuals possess a comprehensive set of core competencies critical for effective performance in specific job roles.

Greatest predictive accuracy achieved throguh a combination of structured interviews, work sample tests, and assessments of GMA & personality.

PREDICTORS OF PERFORMANCE: VALIDITY (R)

Chart data points:
- Age -0.01
- Interest 0.1
- Years of Education 0.1
- Years of Experience 0.18
- Conscientiousness 0.31
- Assessment Center 0.37
- Unstructured Interviews 0.38
- Structured Interviews 0.51
- GMA Test 0.51
- Work Sample Test 0.54
- GMA + Unstructured Interview 0.55
- GMA + Conscientiousness 0.6
- GMA + Structured Interview 0.63
- GMA + Work Sample Test 0.63

*Based on the Vailidity and Utility of Selection Methods in Personnel Psychology Practical and Theoretical Implications of 85 Years of Research Findings, Psychological Bulletin, Vol. 124, No. 2, 262-274

Candidate Behavioral Data

STRUCTURED INTERVIEWS:

HireVue's asynchronous OnDemand structured interviews are the basis of the interview assessments. In an OnDemand interview, candidates record their responses to interview questions at the time of their choosing, on any device. In the same fashion, recruiters and hiring managers can review candidates' interviews side-by-side at any time. Generally, the interview questions are linked to specific competencies that are critical to success in the target job. The average recorded response is 15-20 minutes long.

Since 2015, HireVue has used artificial intelligence to transform asynchronous competency-based OnDemand interviews into a more robust, validated pre-hire assessment that can scale. The data in a recorded interview is the same data humans parse when interviewing a candidate, with the exception of behaviors that contribute to bias. Interviews are scored entirely based on the content of candidates' responses, using state-of-the-art speech-to-text transcription and natural language processing. Features are engineered using the latest advancements in Natural Language Processing with a pre-trained algorithm called Robustly Optimized Bidirectional Encoder Representations from

Transformers Pre-Training Approach (RoBERTa) that is fine-tuned on interview data. These features get at more nuance and context in speech and are robust to differences in word choice, focusing more on meaning and intention [10]. When compared to older methods, these features have been shown to improve stability to differences in word choice, focusing more on meaning and intention. In the end, interview scoring algorithms use these speech inputs to generate competency scores that are presented in feedback reports and candidate lists.

GAME-BASED ASSESSMENTS:

Game-based assessments are a series of short psychometric games each built upon Psychological Construct underpinnings. Each game takes only a few minutes to complete, and different games give insight into a range of cognitive skills (e.g., numeracy, problem-solving, and attention), non-cognitive abilities (e.g., empathy and influence), and the Big 5 personality traits (e.g., conscientiousness, and extraversion). A complete game-based assessment typically involves a battery of different games and takes 10-15 minutes to complete.

Games are modeled after, and validated with, traditional psychometric assessments and are designed explicitly to measure job-relevant competencies (e.g., cognitive ability, emotional intelligence, or personality). These assessments are adaptive, meaning they adapt in real time based on a candidate's performance. If a candidate successfully

completes one task in a game, the next task they will be asked to complete will be more difficult. If they struggle and fail a task, they will be given an easier task. Ultimately, the adaptive nature of game-based assessments creates the opportunity to more quickly and accurately measure a candidate's specific level of ability. Data gathered from gameplay pertains to details about the candidate's performance while playing the game (e.g. highest level reached, sentiment of text interactions, etc.) which are predictive of the specific skills, competencies, and personality traits that have been shown to be valuable in their desired role. Scores from the game-based assessments are presented in feedback reports and candidate lists.
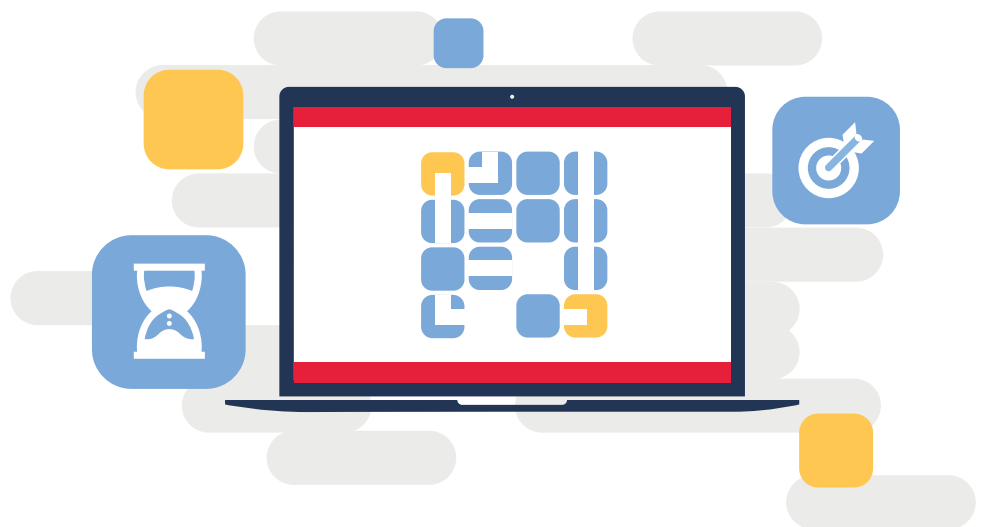
Fairness of HireVue's Assessments

When HireVue assessments are created (as described above) we go beyond simply measuring the specific competency or ability, we also perform validation testing to ensure that our algorithms can predict the outcome with an acceptable level of accuracy. Additionally, testing is performed to ensure that specific demographic groups are not adversely impacted by the algorithm. The candidate's protected attributes are not measured directly, and any assessment behaviors that are correlated with protected attributes are adjusted in the algorithm to ensure that they do not cause significant bias. The result is a highly valid, bias-mitigated assessment that is applied equally to all candidates, regardless of their demographics.

Accordingly, HireVue's approach offers an improvement over traditional cognitive ability assessment tools and statistical methods that tend to suffer from larger trade-offs between validity and adverse impact.[11] The ability to meet and advance the diversity goals of an organization continues to be a primary focal point for HireVue.

The Advantage of A Comprehensive Assessment

Today the organizations that move fast are frequently rewarded with the best talent. The combination of interview and game-based assessment means companies can collect a comprehensive set of data on each candidate in a single hiring process step introducing significant hiring efficiencies. Also, unlike a legacy assessment, where assessment scores are often provided with little context, recruiters and hiring managers can watch a candidate's corresponding interview and make their own structured evaluation. Interview and game-based assessment scores provide crucial decision support for recruiters and hiring managers, but they do not take away their discretion.

Designing Comprehensive Modular Assessmnents

Modular assessments come with thoroughly researched questions and competency-based algorithms indicative of job success within specific job roles. Before implementing a modular assessment, a job analysis should be conducted to ensure that the assessment is measuring the appropriate set of competencies required for success in the job. In the job analysis stage, HireVue draws upon subject matter experts (SME) that are familiar with the requirements of the target roles for which the assessment will be used. The valuable data provided by the SME's identifies the knowledge, skills, abilities and competencies needed to be successful in the target jobs. Based on the data collected in the job analysis a competency model is created that becomes the foundation for the assessment build. HireVue draws

upon its Job Fit Framework (Figure 1) to conduct the job analytic and competency modeling work.

In combination with job analysis, modular assessments provide relevant insight into candidates' competency-based fit to augment selection decisions. The implementation steps to identify and launch a comprehensive assessment are as follows:

JOB ANALYSIS:

Ensure overlap between the work behaviors and key competencies required for effective performance on the job and the competencies measured.

SELECT MODULAR ASSESSMENT COMPETENCIES BASED UPON JOB ANALYSIS RESULTS:

Present and confirm linkage between the targeted job roles and the modular assessment solution.

IMPLEMENT:

Once the linkage is confirmed, then the assessment is designed and deployed to augment selection decisions for competency-based hiring.

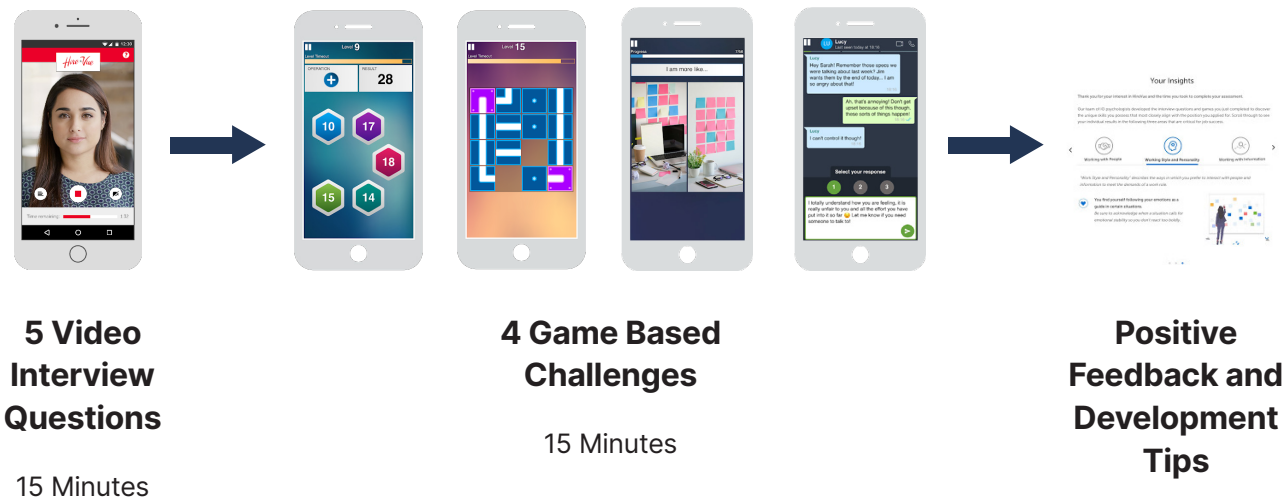| ANALYZE TARGET ROLES & DETERMINE TASKS & KEY COMPETENCIES REQUIRED | ASK THE RIGHT ASSESSMENT QUESTIONS | IDENTIFY TOP CANDIDATES | **FIND THE BEST HIRE** |

Once the job analysis-based competency model has been established, the modular assessment can be created using interview and game-based questions. The interview and game assessments can be combined into a single experience, providing a comprehensive evaluation of each candidate in under 30 minutes. Additionally, with insight into a range of different competencies, recruiting teams can enhance hiring decisions by considering candidates with complementary attributes and have hiring that

reflects the complexities of the modern workplace. For example, in Figure 4, we show a blended assessment that leverages best-in-class solutions from interview and game-based assessments that quickly and accurately measure essential competencies for success in the target job family. Figure 5 illustrates how a modular assessment can be constructed to measure a broad set of competencies across different modalities.

FIGURE 4: COMPETENCY FRAMEWORK AND MODALITY OVERVIEW

5 Video Interview Questions

15 Minutes

4 Game Based Challenges

15 Minutes

Positive Feedback and Development Tips

A typical HireVue Assessment experience including interview and game-based components. Assessments can be taken any time, in one go or with breaks in between.

FIGURE 5: ILLUSTRATION OF COMPETENCIES BY MODE OF ASSESSMENT

COMPETENCY NAME	INTERVIEW	GAME-BASED: COGNITIVE	GAME-BASED: PERSONALITY	GAME-BASED: SJT CHAT
COMMUNICATION	X			
ADAPTABILITY	X			
DRIVE FOR RESULTS & INITIATIVE	X			
COMPOSURE	X			
TEAM ORIENTATION	X			
COGNITIVE ABILITY		X		
CONSCIENTIOUSNESS			X	
EMOTIONAL INTELLIGENCE				X
SERVICE ORIENTATION	X			

Interview and game-based assessments can be combined into a single experience, providing a comprehensive evaluation of each candidate in under 30 minutes.
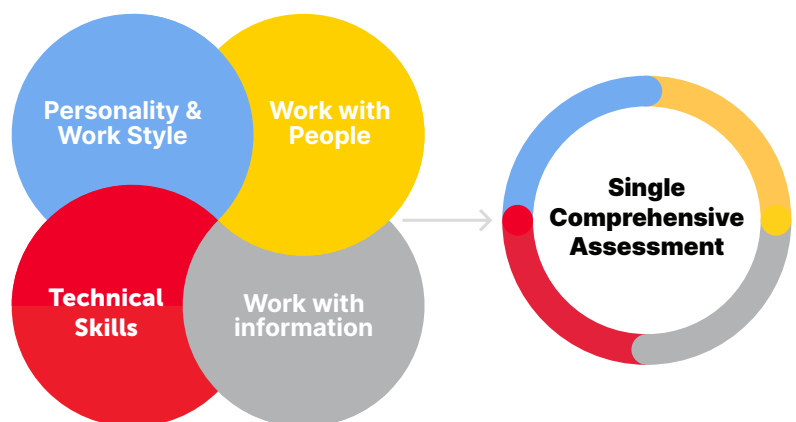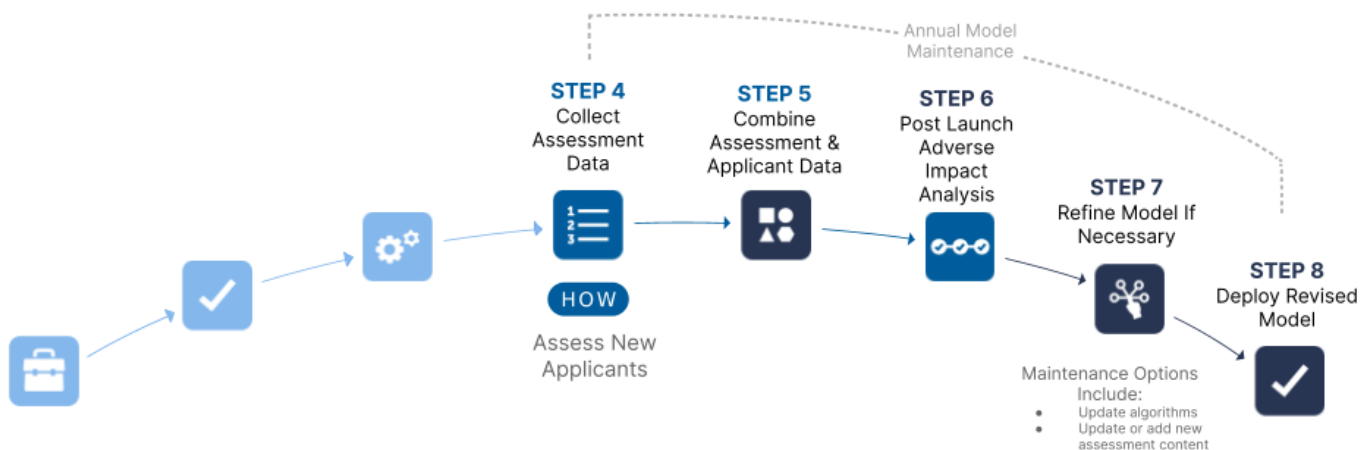
Maintaining and Updating Assessments Over Time

To take advantage of the continual improvements HireVue makes to its modular assessment content and scoring algorithms, each assessment can be updated to the latest modular content and/or scoring models after implementation. An annual model maintenance project consists of the following activities:

✦ An adverse impact analysis to ensure applicants across different demographic groups are scoring similarly, and/or passing at comparable rates

✦ Review assessment content to ensure it meets Buyer needs

✦ Update the scoring models with the most up-to-date competency algorithm

✦ Update the scoring models with the most up-to-date technology

✦ Update the Game packages with the most up-to-date algorithms

MODULAR ASSESSMENT IMPLEMENTATION WITH MODEL MAINTENANCE & UPDATES

The Candidate Experience

In the past, candidate experience was a minimal concern when considering a pre-hire assessment. Talent was often asked to wade through a complex hiring process and time consuming steps including a pre-hire assessment.

The best candidates generally do not want to sit through hours of testing. Interview and game-based assessments mean recruiters can quickly identify top-tier talent, adequately evaluate skills, and help candidates navigate through the hiring process faster than traditional models.

The candidate experience also has a direct impact on an organization's ability to recruit talent. According to the Talent Board's 2020 Candidate Experience Research Report, candidates who had a great experience, their willingness to increase their relationship with the employer goes up 67%.

There's a secondary impetus for organizations who sell to consumers. 74% of candidates who had a great experience said they would increase their business relationship with the hiring organization. 46% of candidates with a terrible experience said they would

sever their business relationship. By combining two new, validated, assessment delivery modalities, talent acquisition departments get the best of both worlds. They can respect the candidate's time with a single, engaging assessment, while gaining crucial insight into a comprehensive range of job competencies.

FIGURE 6: CANDIDATE RATINGS OF HIREVUE INTERVIEWS

80%
Agree it's an effective way for companies to get to know them.

85%
Agree perceptions of the company were positively affected

83%
Appreciate the fairness and consistency

88%
Appreciate the time flexibility

Customizing the Assessment

Organizations typically begin with a modular assessment and then may transition to custom predictive algorithms built around their specific performance data and outcomes. This allows recruiting teams to kick start AI-driven assessments with modular algorithms for a quicker launch while still gaining the organization-specific insight that comes from a custom algorithm built over time. More specifically, custom algorithms are role-specific and built by linking question responses to customers' job performance data, thus the custom algorithm is predictive of success in the specific role in that company. Custom assessments can be Interview, game-based, or a combination of the two.

The general steps to creating a Custom Assessment are as follows:

COLLECT ASSESSMENT DATA

Applicant and new hire data is monitored to establish enough data for a baseline evaluation and local validation study using job performance and the assessment data from 400 or more employees in the target jobs.

COMBINE ASSESSMENT & APPLICATION DATA:

Modular assessment data (interview responses and or game play data) are matched with new hire performance data to begin local validation.

REFINE MODEL IF NECESSARY:

Applicant responses and performance data are statistically linked to refine scoring algorithms.

CONDUCT ADVERSE IMPACT AND MITIGATION ANALYSES:

Detailed adverse impact analyses are performed and mitigation is conducted as needed. The final algorithm is optimized for maximal prediction and minimal bias.

DEPLOY REVISED MODEL:

The assessment is re-deployed and implemented to help augment hiring decisions. Effectiveness and Adverse Impact is monitored to ensure ongoing validity.

Conclusion

Pre-hire assessments are a scientifically robust way of evaluating candidates and have a long history of success, but legacy assessment testing has not kept pace with the complexity and constraints of the modern workplace. Evaluating a comprehensive range of competencies required for job success with a battery of tests and interviews would require hours and multiple steps with conventional methods. This is neither realistic nor respectful to today's candidate.

Artificial intelligence has enabled the creation of two complementary and validated assessment types. Interview assessments evaluate candidates' responses to competency-based structured interview questions. Research demonstrates that structured interviews do an excellent job of evaluating candidates' interpersonal skills, communication skills, and personality traits. Game-based assessments offer an engaging experience for candidates, while providing an accurate alternative measure of cognitive ability over traditional assessments. Game-based assessments may also be designed to measure non-cognitive abilities and skills such as personality traits and emotional intelligence. Games and Interviews can be used by themselves to assess job relevant competencies. They can also be combined into a single experience to provide complementary insight into a comprehensive range of attributes necessary for success on the job in under 30 minutes.

Using our sophisticated methods to identify and mitigate adverse impact, HireVue's next generation of Pre-Hire Assessments maintain the predictive accuracy of legacy assessments while minimizing adverse impact. This time-efficient, combined approach increases the likelihood of completion and provides candidates with an engaging experience that respects their time, while accurately and objectively evaluating them on a wide range of job competencies so recruiting teams have the data they need to make the best possible hiring decisions.

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