

Workforce Analytics

Essential Tools for Managing Your Most Valued Resources – Now and in the Future



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Preparing for the Next Workforce Crisis

Human resource executives are on the front lines of organizational response during a crisis, making it imperative that they have the data to help drive decisions and innovation. Before the global pandemic, the looming crisis HR managers were focused on was the “Silver Tsunami” – the retirement of the baby boomer generation. Millions of baby boomers around the world are approaching retirement age, and just about every industry and area of government is poised to lose vast numbers of highly skilled, experienced workers. Many of these workers hold critical leadership positions, both formally (through title) and informally (based on their knowledge and experience). At the same time, HR executives were facing a looming job demand crisis because by 2030, many of the world’s largest economies would have more jobs than available people to fill them. The ramifications of the job demand crisis would be far-reaching and transformative for all countries, industries and levels of government.

Then the global pandemic hit, and again, HR executives have been thrown on the front lines to reimagine the new normal and figure out how to keep business going while dealing with new expectations such as social distancing, contact tracing, having employees work remotely, and more.

And these are just the global challenges that HR is being asked to deal with. There are also unpredictable government and industry-specific events that can suddenly spike demand for certain skills and expertise. For example, if the US government adopts a single-payer health system that covers all citizens and immigrants – legal and otherwise – there will be overwhelming demand for more doctors, nurses and allied health professionals. Similarly, ongoing assessments by federal administration officials can result in executive orders requiring major shifts in human capital assets from agency to agency. For example:

- The US Border Patrol is expected to increase its workforce by 5,000 agents.
- US Immigration and Customs Enforcement is increasing its workforce by 10,000 agents.
- The Environmental Protection Agency will be decreasing its workforce by 3,200 employees (almost 20%).
- There are also significant staffing concerns across key government offices and locations. For instance:
 - The Interior Department has budgeted for a firefighting workforce of about 5,000 in 2020, but it’s short hundreds of firefighters due to recruitment problems and a federal government shutdown.
 - The Department of Defense does not conduct a routine monitoring of its space acquisition workforce. The Pentagon needs to collect comprehensive data on the size, mix and location of its workforce that will handle the planned \$65 billion procurement of space offerings such as satellites, launch vehicles and ground control facilities through 2023.
- For the Veterans Administration, human capital management continues to be a high-risk area due to mission-critical skills gaps within the federal workforce. Structural issues – such as outdated position classification and pay systems, poor recruiting and hiring processes, and challenges in dealing with low-performing personnel – make it difficult for agencies to recruit, retain and develop skilled workers.

Whatever crisis HR organizations may face, one thing is clear: they need more effective, data-driven tools to help them forecast changes in supply and demand and develop effective plans to achieve hiring, retention and performance goals. The right data - combined with analytics, machine learning and artificial intelligence - can help HR executives lead their organizations amidst crisis, regardless of what form that crisis may take.

Advanced Analytics and Artificial Intelligence to the Rescue

HR departments are working hard to address these challenges. But they need the right aggregated and cleansed data ready for analysis - and the ability to model this data to accurately simulate and forecast supply, demand, attrition and human responses to different policies and plans. Without these capabilities, HR organizations will never achieve data-driven, strategic decisioning. How can federal and state governments, for example, address the upcoming mass exodus of workers if they lack answers to fundamental questions such as:

- What skills are government organizations in the most danger of losing, especially highly valued ones, such as cybersecurity or auditing?
- Is there a certain location or congressional district that is at risk for a sudden flood of retirements?
- How many people can I expect to retire in the next six months to three years?
- Is there a certain function or office that is susceptible to a mass exodus of senior leaders and institutional knowledge?
- Are any of the people I expect to retire currently working on the new administration's priority focus areas?

Workforce analytics solutions are the key to answering these types of questions, which in turn enables better outcomes for organizations. HR leaders can access data-driven insights needed to make decisions that drive results and support short- and long-term strategies. They can forecast attrition, understand its root causes and test different plans to retain top talent - before it's too late. They can improve their organizations' performance, engagement, innovation, agility and competitive position. They can reduce costs and risks while improving results. They can enhance the value, productivity and morale of their workforce. And they can gain the analytic insights needed to perform as trusted, strategic advisers to hiring managers and the executive team.

Key Areas of Impact

Figure 1 (next page) shows the top areas where workforce analytics can provide the most value:

- Workforce planning and readiness.
- Recruiting and retention.
- Workforce cost analysis.
- Succession planning.
- Training.

Let's take a closer look at the kinds of challenges organizations face in each of these areas and explore how advanced analytics and AI equips HR leaders and other decision makers to anticipate and address them more effectively.

ISSUES	LEADING PRACTICES	HIGH-IMPACT METHODS	ANALYTICAL TECHNIQUE USED
Workforce planning and readiness	Understand skill sets and geographic location	Develop, optimize and forecast models	Forecasting, what-if analysis, reporting, risk scoring
	Gain insight into supply and demand of skill sets	Conduct what-if analysis models	
Recruiting (risk scoring candidates) and retention	Understand why, when, how employees behave	Develop risk propensity scores	Risk scoring, predictive modeling, forecasting, what-if analysis
		Define key leading indicators	
		Predict employee behavior	
Cost of workforce	Understand cost per employee	Define cost models for granularity	Cost modeling, forecasting, what-if analysis
	Understand cost based on program requirements	Develop cost correlation models	
Succession planning	Balance a mixed portfolio of skill sets	Optimize workforce portfolio	Correlation, forecasting, what-if analysis, optimization
	Balance experience and tenure	Develop employee churn forecast models	
	Funnel staff to growth and promotions	Implement training curriculum for growth	
Training	Understand training requirements	Define training requirements	Predictive analytics, optimization, forecasting
	Develop training path across the enterprise	Optimize training across the enterprise	

Figure 1: SAS has identified the top areas where workforce analytics can provide the most value and the most effective methods.

Workforce Planning and Readiness

In light of the trends noted above, one of the biggest challenges organizations face is ensuring they have the right supply of skilled and experienced people in the right place at the right time to meet the demand for various jobs - now and in the future. HR needs a detailed understanding of the employee skills available today, forecasts of the skills they will need in the future, and a geographic or location-based view of this information. Supply and demand planning can also involve planning for the assets workers need to do their jobs.

For example, the Department of Homeland Security agency may have the right number of the snowmobile operators staffed on the Canadian border, but if the snowmobiles their employees use are constantly in maintenance, then the agency isn't actually ready to accomplish its mission. Similarly, if the snowmobiles are operational and people are in the right place, but those people aren't trained on how to operate the snowmobiles, then the agency isn't ready to conduct its mission. It is critical to analyze both the people - including their skills, location and availability - and the readiness of their equipment to achieve effective workforce management and readiness.

Workforce analytics and AI can help by enabling HR to create and optimize models that forecast supply and demand with a high level of accuracy. HR can also use models to conduct what-if analysis. This is valuable to business leaders who want to look at different scenarios, assess their risks from a supply-demand perspective and make informed decisions.

For example, consider how the US Marine Corps performs analyses to advise and assist executive decision makers on the possible effects of policy changes that would affect enlisted promotions and retention. On an annual basis, the Marine Corps retains less than 30% of enlisted members on their initial contracts. In some cases, this can create gaps in manpower and readiness, especially when Marines in certain occupational specialties are promoted to the rank of E5 prior to the end of their initial contracts. In fiscal year 2018, approximately 30% of Marines who exited after their initial contracts (48 months) reached the grade of E5 prior to exiting active service.

To prevent this potential gap in manpower in specific occupational fields, a newly proposed policy change would not allow promotions to E5 in specific occupational fields prior to members reaching 48 months of service. The Marine Corps took an in-depth look at different occupational specialties and all enlisted ranks with regard to future manpower planning decisions. The organization used various procedures, techniques and other statistical analysis methods to see where the policy change would affect its workforce. The Marine Corps also examined promotion rates, which can affect the ability of Marines to complete required training prior to consideration for advancement.

Recruiting and Retention

As noted earlier, recruiting and retention challenges will continue to intensify for government agencies and businesses alike. On the recruiting front, HR will need to identify the best candidates and assemble the right packages and incentives to yield sufficient numbers of new hires to meet demand.

Advanced analytics and AI can help in many ways. HR can use text analytics, for example, to efficiently look through unstructured text data in résumés and exit surveys. This is useful for analysis to identify top candidates and their key qualities, including education, tenure, certifications, years of experience and more.

Natural language processing (NLP) makes text analytics incredibly fast and accurate. A recruitment process typically manages a wealth of text data, such as recruitment notes, résumés, medical tests, references and feedback comments. With data volumes and types growing daily, NLP helps HR overcome the challenges of identifying and categorizing text data. It enables organizations to scale the human act of reading, organizing and extracting useful information from huge volumes of textual data. In addition, it enables the analysis and categorization of vast sets of documents. NLP can automatically convert even unstructured data into meaningful insights that feed machine learning models to drive better decisions.

Forecasting and optimization tools enable HR to predict the future behavior of people based on past data. It also helps HR understand which information – across a wide range of input data – is most relevant and useful in predicting the future. Based on optimized forecasts, decision makers can make informed judgments about how to reduce the cost per hire, the best time to hire, the best sources of candidates, how to score candidate experience, the likelihood of job offer acceptances and projected rates of new hire turnover.

It is critical to analyze both the people – including their skills, location and availability – and the readiness of their equipment to achieve effective workforce management and readiness.

On the retention front, analytics and AI can predict which employees have the highest probability of voluntary termination. Once you identify them, you can use analytics to accurately model how different incentives or variables reduce voluntary turnover. Voluntary turnover forecasting is only as accurate the quality and breadth of data being modeled, which should include, at a minimum:

- Position description and standard code.
- Employee grade and step.
- Salary locality adjustment.
- Employee duty location.
- Employee start and end date.
- Veterans preference (if applicable).
- Tenure.
- Age.

You can use other data and extend models to increase turnover model accuracy. For example, SAS has collected over 65 separate data variables to predict attrition. And we've developed more than 100 calculated variables or incentives (such as cash incentives) that you can model to understand which incentives and HR actions will best persuade an employee to stay or leave the organization. These actions can include:

- Cash awards.
- With-in grade increases (WIGI).
- Step increases.
- Time off awards.
- Change of work schedule (such as flexibility to work one day a week at home).
- Training.
- Promotion.
- Early retirement packages.
- Enhanced or additional employee benefits.

Each of these actions - and combinations and permutations of these actions - has a different financial cost. And each has a different effect on the attrition rate for different employees based on their age, location and other relevant data. Analytics can model these combinations and permutations for employees with different characteristics so HR can make informed incentive plans that maximize its incentives budget. For example, the model may show that a \$1,000 cash award may lower the attrition rate of an employee by 5%, but \$800 of training may lower the attrition rate by 7%. In this example, the organization may actually get a higher rate of return (2%) for \$200 less of an investment.

Workforce Cost

An organization's people represent a significant component of its total value - and an equally significant component of its costs. Turnover is costly and often underestimated, as organizations lack the systems to track all costs: exit costs, advertising, recruiting, interviewing, screening, onboarding, orientation and training due to lost productivity, potential customer dissatisfaction, reduced or lost business, administrative costs, lost expertise and morale issues for employees left behind. Measuring these costs requires collaboration among departments (HR, finance, operations), data integration and new reporting mechanisms.

Workforce analytics aggregates data to understand the full cost of each employee, including the cost based on program requirements. Using cost modeling, forecasting and what-if analysis, HR can define the total full cost of an employee at a granular level of detail and develop cost correlation models that help justify incentive programs, increases and decreases in training costs, salary and benefits adjustments, and more. HR can also use models to capture the full cost of proposed policy changes. For example, a decision to increase the workforce does not just increase salary and benefits costs, but also costs for recruiting, training, onboarding and outfitting people with necessary equipment, such as computers, badges, bullets, boots and desks.

Succession Planning

HR can use workforce analytics for data-driven succession planning to increase the likelihood of success for promoted employees. For example, HR can use AI to predict the job categories a person is most suited to, as well as rank people by each job category based upon an analysis of their traits and the traits of successful employees in those job categories. Organizations usually have large volumes of data for past employees that they can analyze to identify key traits for job categories and weight these categories by order of importance. Analyzing current employees using this approach helps decision makers match the best people to new roles they will likely to be successful in.

Scorecards can help HR understand why a particular employee was matched to a certain position and with what degree of confidence. The score indicates the likelihood an employee will be successful in a different role and whether they will fit into the organizational culture (for example, by analyzing the candidate's personality and other metrics). Ideally, successful matching data (from confirmed job acceptances) feeds into a self-optimization feedback loop that increases the accuracy and quality of succession planning decisions over time.

A major benefit of this data-driven succession planning process is how it removes bias from the decision-making process. Variances such as the time of day that an employee's application is reviewed - such as right before versus right after lunch - can inadvertently lead to poor decisions. Data-driven decision support eliminates such influences.

With workforce analytics, HR managers can quantify the impacts of various incentive options to control the mass exodus when the baby boomer generation begins to retire.

Key Elements of a Workforce Analytics Solution

As shown in Figure 2 (next page), in order to realize the full value of workforce analytics, you need a robust workforce analytics solution that empowers you to:

- Gather, transform and integrate data from as many relevant sources as needed to inform decisions in a shifting work environment.
- Use data mining on past and present employee data to discover workforce behaviors and motivations, understand the likelihood of employees taking certain actions (such as leaving or seeking certain opportunities), and spot hidden trends and patterns behind workforce effects.
- Use multiple, advanced forecasting techniques to analyze data and generate the best forecasting model possible for a particular slice of data to understand future workforce conditions.
- Enable analysts and business users to run what-if scenarios to simulate the outcomes of policy changes, understand the financial impacts of proposed strategies, and/or weigh the cost and benefits of different actions.
- Provide a mechanism to optimize allocations of human capital based on various constraints, such as financial, political and union restrictions.
- Quantify and preserve data- and evidence-based exploration to support budget and resource decisions.

HR can use workforce analytics to focus on hiring for specific population groups, such as women, veterans or minority candidates. Predictive models can be trained to achieve target recruitment numbers for these groups.

How AI Derives a Proposed Promotion or Hiring Recommendation

It's important that HR executives can understand and interpret the outputs of a hiring or succession planning model so they have confidence in the artificial intelligence driving decisions. For example, they need to see how the AI scores each candidate against each of the specific job matching criteria, as well as the total risk score, which is calculated based on compounding areas of interest. To better understand the overall score, HR executives can drill into individual areas of interest and use findings to make an informed decision.

To determine the best alternative job options for candidates, AI can match each person against every job category and rank them according to the determined list of desired and required traits. This is useful for both HR and employees, as most people are unaware of all the job categories available to them and the roles in which they would likely be successful. In many cases, employees find that they will have a greater chance of success if they take a different job category.

Machine learning acts as an ongoing, built-in feedback loop, analyzing confirmed job acceptances and the success of people who took various roles. These findings automatically refine and improve the AI model so that it more accurately assesses future employees or candidates.

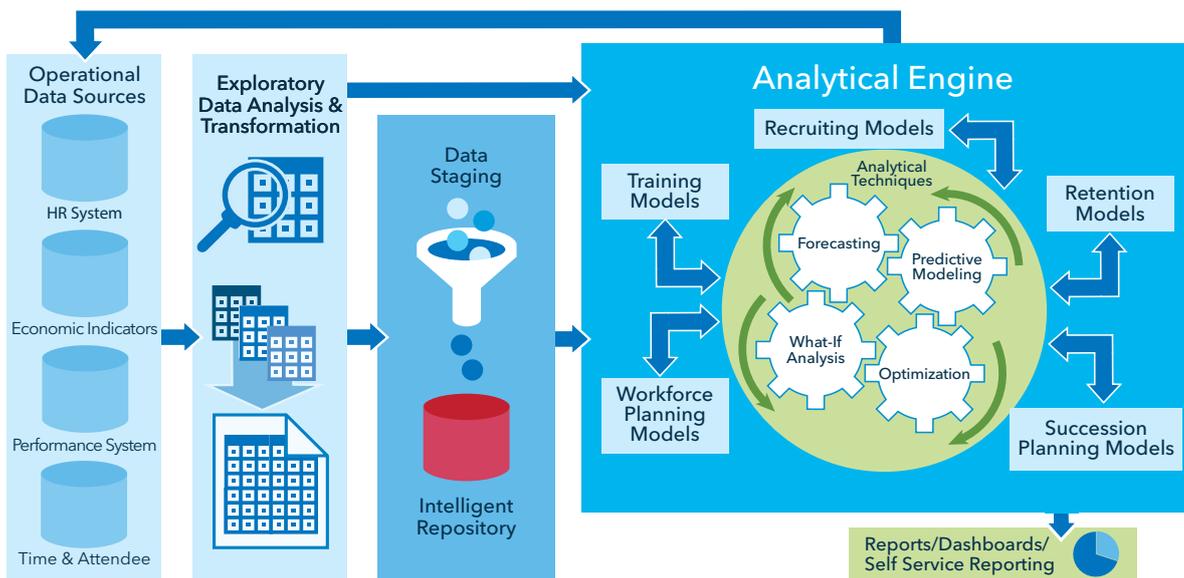


Figure 2: Success requires a robust workforce analytics engine with key capabilities.

It All Starts With Data Integration, Transformation and Staging

As shown in Figure 2, data integration and quality are the foundations of a strong people analytics practice. For most organizations, this means establishing consistency and governance across multiple systems. The latest research on HR systems shows that the average large company has more than 10 different HR applications, and its core HR system is more than six years old. It is unrealistic to rip and replace those existing systems to create a single view of people. That would take time and resources the business does not have.

Instead, an effective workforce analytics strategy needs to plug and play well with all HR systems and applications. But it doesn't end there. A powerful people analytics platform runs on an intelligent data repository that draws from the entire enterprise, pulling from other systems that provide data on project performance, time and attendance, case management systems, external labor markets and more. And it must do all this without adding IT complexity or processing delays.

Once you integrate and aggregate the data, you must cleanse and transform it for analytical modeling and reporting. In a database, for example, the title "program manager" can be spelled multiple ways - for instance, PM, P.M., P. Manager, Prog. Man. and so on. This phenomenon appears to represent multiple position descriptions; but in reality, there is only one position description that has been spelled multiple ways. Therefore, when chief human capital officers are asked basic questions like, "How many program managers do we have?"; there is no quick and accurate answer. To find out, they go through a very time-consuming data manipulation exercise.

Ideally, all this aggregated, cleansed, transformed data is centralized in an intelligent data repository and continuously updated through automated data flows. This ensures that the analytics capabilities of the platform always have the latest data and can deliver accurate reports and analytic modeling outputs.

Solving Complex, Real-World Problems With SAS® for Workforce Analytics

SAS workforce analytics solutions deliver on all of these requirements in a flexible and scalable way. To understand the value of SAS workforce analytics for governments, let's take a look how the US Special Operations Command used these technologies when too many candidates were failing to complete its training program. This drove up costs (on average, the government spends \$45,000 per soldier who starts the qualification course) and made it difficult to ensure it had personnel to meet mission demands. SAS helped Special Operations Command identify candidates with the qualities needed to successfully graduate from its training program - as well as weight qualities with the biggest impact on their success.

Learn More

To learn more about how SAS solutions can help you plan for the future, visit sas.com. You can also explore [recommended reading for defense and national security](#).

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