

What Can We Learn from Measuring Unit Culture?

Preliminary Evidence from a Data-Centric Approach to Organizational Performance

Lt. Col. Jonathan D. Bate, U.S. Army

1st Lt. Nicholas T. Calhoun, U.S. Army

“Do you inspire your soldiers?” The brigade commander asked this question intently as he looked out across an audience of dozens of command teams during a brigade leader professional development event. What sparked the question was the fact that just days earlier, the brigade’s grassroots data analytics team had discovered a relationship between soldier “inspiration” at the company/troop/battery (CTB) level and fewer harmful behaviors during the previous quarter. This analysis provided empirical evidence that enabled an evidence-based conversation about a potential way to reduce harmful behaviors across the brigade.

“Data analytics” can be an intimidating term, invoking complicated statistical methods best left to scientists and academic researchers. The truth is that a wealth of knowledge exists within the data that tactical formations produce, and anyone can unlock it with a basic level of technical skill. The resulting insights allow commanders to make data-centric

decisions based on evidence informing—not replacing—experience and gut instinct. The brigade commander’s question above shows how integrating the art and science of data to construct a compelling narrative about what factors might help us achieve our desired outcomes.

A recent article introduced the data-centric approach to unit culture in 1st Stryker Brigade Combat Team, 4th Infantry “Ivy” Division (1/4ID).¹ Since then, the brigade has gained three main insights from its approach to “culture analytics”—in addition to the inspiration results mentioned above, we also discovered that soldier perceptions of their level of professional development are correlated with higher retention results. After analyzing recent Stryker gunnery scores, we also discovered that the strength of a company’s culture is positively correlated with that company’s lethality.²

While these three examples provide limited evidence from a single snapshot in time for a unit, they are examples of potentially more wide-ranging results and



Soldiers assigned to the 4th Infantry Division walk onto a land navigation course during testing for the Expert Infantryman, Soldier, and Field Medical Badges on Fort Carson, Colorado, on 4 December 2023. Land navigation prepares Ivy soldiers for navigating unfamiliar territory in a combat situation. (Photo by 1st Lt. Collin Wampler, U.S. Army)

provide tangible examples of how insights from data can inform command decisions.

Grassroots Data Analytics at the Brigade Level

Take the data analytics team that found these results for example. The Raider Analytics, Innovation, and Data (RAID) Team was founded in 1/4ID to support the secretary of the Army's second objective to build a modernized, data-centric force with a deeper data-informed sense of the battlefield.³ The team generates insights supporting problem-solving and decision-making by analyzing the brigade's data on harmful behaviors, equipment readiness, and lethality.⁴ These insights have allowed the brigade to direct company commanders on where to leverage their resources most efficiently and have also informed the 4th Infantry Division on what aspects of mounted machine gunnery table contribute to higher lethality

among crews, supporting the division's "Creativity and Innovation" initiative within its Ivy Arc leader development framework.⁵

The RAID Team is a grassroots effort in the sense that its members participate voluntarily and on their own time outside of their regular positions in the Army.⁶ The team comes from all corners of the brigade. They are infantry platoon leaders, master gunners, battalion executive officers, the brigade provost martial officer, and other soldiers who collaborate regularly to produce data-backed results. Most are motivated only by a desire for a more effective and more efficient force and a passion for data analysis. None have been trained by the brigade to accomplish these objectives—thus far, the team has run solely on its members' experience with data analysis in their prior education and experiences.

Data analysis in this form is effective because the Army already collects treasure troves of data that are

ripe for examination. Data records are maintained in Vantage, Global Combat Support System—Army, unit internal trackers, and surveys such as the Defense Organizational Climate Survey. This data is often recorded, stored, and forgotten. Once a couple years go by and leadership changes, how can the Army expect to improve its effectiveness when these valuable insights are never discovered and passed on? All these numbers need is a single data-literate soldier to clean the datasets and perform data analysis to find hidden relationships.

These insights are not meant to replace experience and gut instinct. Rather, they inform commanders to make data-centric decisions that complement the experience within our ranks. These insights give commanders an empirical position that can dispel uncertainty. The brigade commander's question above shows how integrating the art and science of data to construct a compelling narrative about what factors might help us achieve our desired outcomes.

A Bottom-Up Approach to Data-Centric Decision-Making

At its core, data analysis is a two-step process: collect the data and then analyze it. Although there are vast amounts of datasets in the Army, it is important to organize the preexisting data and collect more data to measure factors of interest that are not captured by traditional methods. Once we have a pool of measurable variables, we can then proceed to conduct analysis using regressions, machine-learning algorithms, and other methods familiar to team members. None of these methods require expensive platforms. All our research has leveraged free software like R-Studio and Python.

The basis for this article stems from results gathered in the Ivy Raider Culture Survey that we disseminated throughout the brigade to quantify various dimensions of unit culture at the company level.⁷ It leveraged a short cell phone-based survey to collect over three thousand soldier responses across thirty-seven CTBs in February 2024. This recorded numerical responses across seven numerical culture “measurables”—such as quality of information flow or the extent to which their leaders cared for and valued them—on a 1-to-10 Likert scale.⁸ We compiled the survey responses into a spreadsheet and calculated an average score for each CTB.

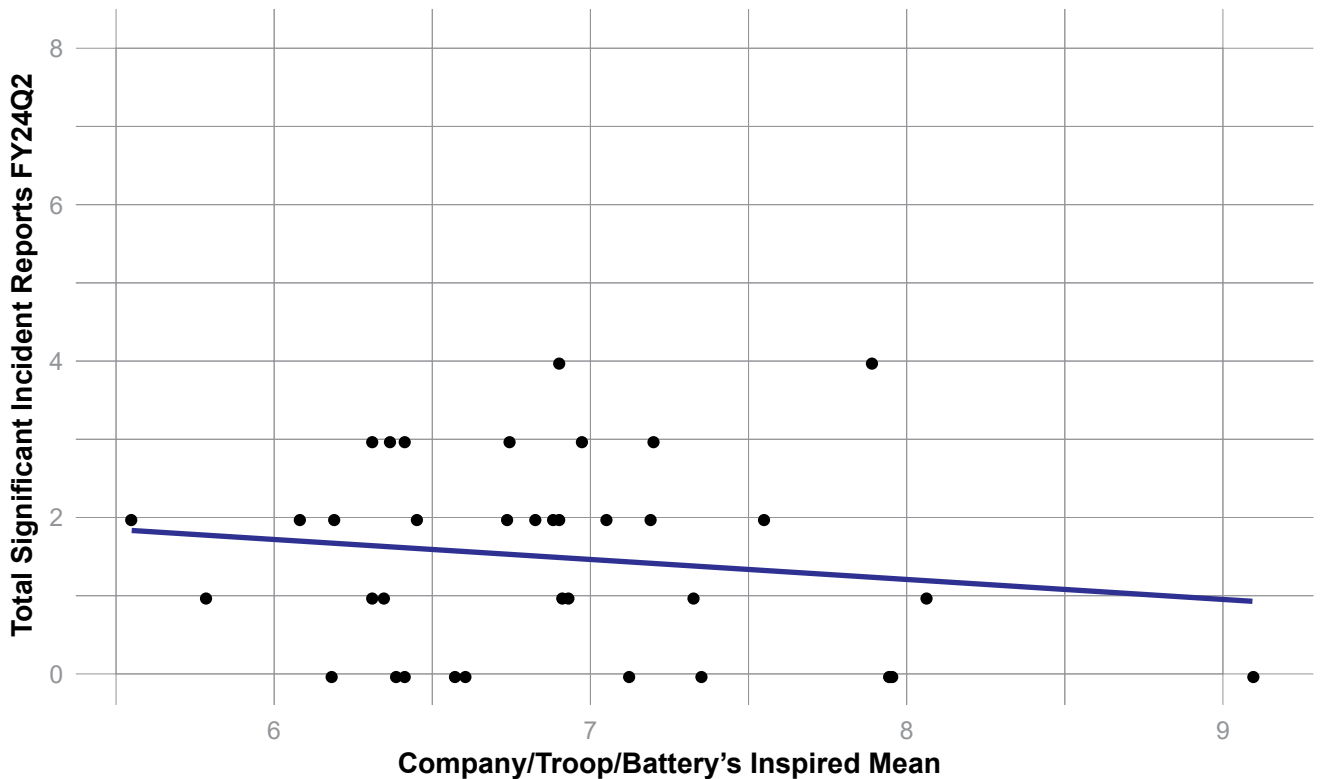
Using this survey, we quantified what was only an abstract concept before, allowing us to use mathematics to then discover what drives how “inspiring” leaders are, or, on the contrary, what negative effects uninspiring leadership may tangibly have on our formations. The real world is very complex, however, so it can be difficult to reveal the relationship that soldier inspiration has on a company's prevalence of significant incident reports (SIR) when there are countless other variables that drive harmful behaviors to consider. This is where the vast data collection in the Army comes in.

To investigate the relationship between harmful behaviors and soldier inspiration, we need to incorporate additional variables that may influence a company's number of SIRs to home in on the effect that soldier inspiration has on harmful behaviors independent of outside variance. We used additional variables such as unit type, demographic information pulled from Army Vantage, percentage completion of a CTB's retention mission, and number of SIRs over the past quarter to narrow down the variance in our model. Some variables proved to have no effect on SIR prevalence and were dismissed of. Others proved to capture some of the variance and improve our model.

With the dataset built, we applied statistical methods to detect relationships between culture measurables and outcomes of interest in the data. These methods consisted of two types of standard data linear models: ordinary least squares and logistic regressions. These models tested for statistically significant relationships between variables and estimated the size and direction of these relationships. Statistical significance is important as it indicates whether a correlation is more due to a causal relationship between variables, or if these correlations exist more through chance.

Unit “Inspiration” and Soldier Harmful Behaviors

As mentioned above, when we investigated the relationship between unit culture and harmful behavior, we found a surprising result—only one culture measurable stood out as insightful. There was a statistically significant, negative correlation between a CTB's average score on the inspiration question and the number of SIRs it experienced during the previous quarter. The survey question asked soldiers to respond from 1 to 10



(Figure by authors)

Figure 1. Linear Relationship Between Serious Incidents and Unit Culture of Inspiration

on the following question: “My leaders inspire me and motivate me to do my job.”

An ordinary least squares regression model (controlling for unit type, gender, and average Army Combat Fitness Test scores) suggested that one additional point on a CTB’s inspiration score was correlated (at very high confidence) with 2.7 fewer SIRs during the previous quarter. Using a linear logistic regression model, we found that one additional point on a CTB’s inspiration score was associated (at high confidence) with 20 percent lower probability of it having an additional SIR during the previous quarter. The scatter plot in figure 1 illustrates the linear relationship.

These results suggest that when formations are more inspired by their leadership, fewer soldiers choose to engage in harmful behaviors (for various reasons requiring further investigation). While this result is preliminary and requires further research to verify its robustness and applicability to other units, it provides actionable data discovered using simple data modeling. It provides commander teams evidence—and a

working hypothesis—on where to focus their efforts to reduce harmful behaviors.

Unit “Inspiration” and Mounted Machine Gunnery Lethality

Based on preliminary findings, inspiration’s effects also transcend harmful behaviors and can potentially improve lethality as well. In the most recent mounted machine gunnery training for 1/4ID, we captured each crew’s gunnery scores on Table VI. Table VI is a maneuver live-fire range for mounted platforms that is required to certify that a crew is “Distinguished,” “Superior,” “Qualified,” or “Q2” if they fail to achieve the standard score.

We ran a logistic regression to measure the effect that inspiration had on company-level Table VI averages, controlling for the weather that each company experienced while testing their qualifying iterations. We found that a company’s average soldier inspiration was positively correlated with that company’s average Table VI scores to a degree that was statistically significant at



the 99-percent level. In simpler terms, the more inspiring a crew felt their leaders were, the better those crews performed on Table VI.

It was difficult to pinpoint the degree that this effect had on Table VI scores because we were working retroactively with mounted machine gunnery datasets that varied in completeness and depth across battalions, but our analysis gave us empirical evidence of what we already suspected. Inspiring leaders inspire more lethal formations.

Soldier “Development” and Retention

Achieving an annual unit retention mission can pose a challenge to command teams. Soldiers decide to reenlist for a variety of individual reasons; many factors likely drive unit retention, such as economic conditions, bonuses, and family concerns. While these factors are usually beyond the control of command teams, they can impact various aspects of their unit climate and culture. Evidence about what unit factors are correlated with better retention results would thus be useful for decision-making.

We applied a linear regression model to our unit culture data to investigate these factors. We found that one culture measurable was insightful—a statistically significant relationship existed between a CTB’s

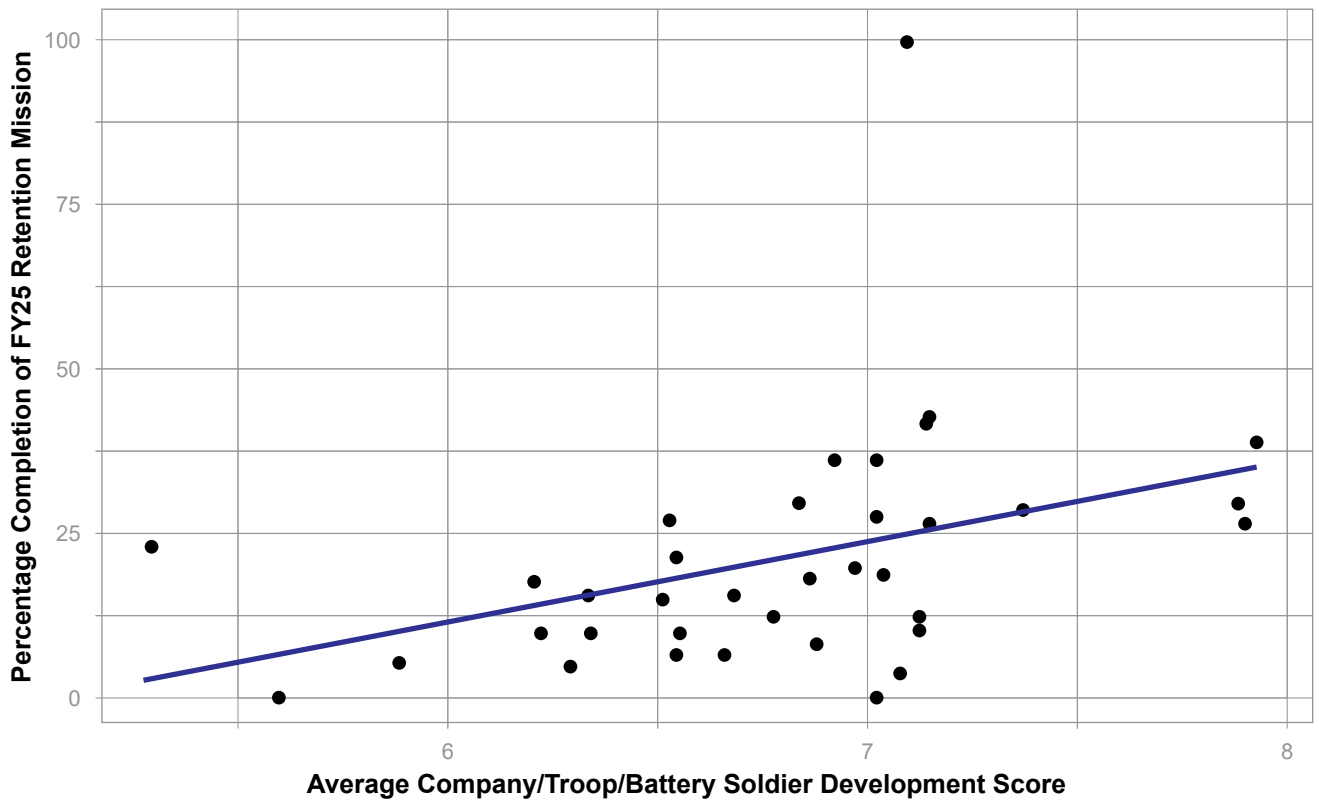
Soldiers from the 4th Battalion, 9th Infantry Regiment, 1st Stryker Brigade Combat Team, 4th Infantry Division, provide covering fire with M249 weapon systems during the Joint Readiness Training Center 25-02 rotation at Fort Johnson, Louisiana, on 3 November 2024. (Photo by Spc. Isaiah Mount, 4th Infantry Division Public Affairs Office)

average score on soldier “development” and percentage completion of their fiscal year 2025 (FY25) retention mission (see figure 2). This prompts soldiers to answer the following question on a 1–10 scale: “I am being developed professionally and have a clear path to achieve my goals.”

One additional point (out of ten) on a CTB’s development score is positively correlated (at 95 percent confidence) with twenty-eight additional percentage points on FY25 retention mission completion. The result holds when controlling for unit type. No other question was statistically correlated with retention results.

So What? Applying Insights from Data

Why should Army leaders care about data sets and regression models? There is no substitute for the vast experience in our formations, and empirical evidence isn’t intended to dismiss of the “gut instinct”



(Figure by authors)

Figure 2. Linear Relationship Between Soldier Development and Unit Retention

commanders must leverage to make swift and decisive actions. We argue that data analytics does not simply tackle academic questions but can provide insights to help inform decisions with real-world impact. These insights help leaders decide where to most effectively focus their limited time and resources to achieve their missions and drive the results the Army needs. As discussed above, our empirical evidence suggests that leader investments in developing and inspiring soldiers may yield positive effects on unit retention, harmful behaviors, and lethality.

Commanders can focus on soldier development through better training, professional schools, and career fairs to increase retention levels within their units. They can focus on inspiration through unit heritage events, competitions, awards, and engagement leadership, which may allow them to spend less time managing SIRs and more time training for their combat missions. Although these are preliminary results, they provide a hypothesis—not inconsistent with the

authors' anecdotal evidence—that leaders across the Army can test within their own formations.

Limitations

It is important to note the limitations of these initial results. First, the Ivy Raider Culture Survey was gathered during a snapshot in time. Unit climate varies over time. There are numerous reasons why this snapshot could yield different results than results gathered a few months later. Survey responses may be more positive or negative during major field exercises during which high-tempo operations can alter a soldier's perceptions. Soldiers may have rushed through survey responses, misunderstood the questions, or altered answers for fear of consequences even though the survey was clearly stated to be anonymous. Any of these reasons has the potential to shift survey responses and alter relationships as a result. Another concern is lack of participation—CTB total responses varied from twenty to 150. Small sample sizes may have skewed the results.

Additionally, it is important to note that while we possessed enough data to perform this analysis and provide actionable results, we were working with retroactive datasets that did not highlight all the dimensions of our questions as much as we would have liked. For example, we only were able to use half of Table VI crew information because some battalions recorded incomplete weather information. We also were not able to control for important factors such as crew composition and whether the crew fired on their task-organized original vehicle. These gaps do not discredit the results published in this article, but they demand the need for more research and better data collection in the future to reinforce our findings.

While it is important to keep in mind that the results do not perfectly reflect reality, they do provide an empirical foundation to make command decisions in these areas that previously did not exist at the tactical level. Moving forward, we intend to refine the survey and its delivery to maximize it as an accurate measurement of unit culture. Additionally, we will deliberately check the statistical results against anecdotal evidence to ensure they are consistent with reality. Numerous

Lt. Col. Jonathan Bate, U.S. Army, commands 2nd Battalion, 23rd Infantry Regiment, 1st Stryker Brigade Combat Team, 4th Infantry Division. He also leads the brigade's grassroots data analytics team. He previously served in the 101st Airborne Division, the 1st Armored Division, and as assistant professor of economics in the U.S. Military Academy Department of Social Sciences. A Goodpaster Scholar in the Advanced Strategic Planning and Policy Program, Bate holds an MPP from the Harvard Kennedy School and PhD in political science from Stanford University.

conversations with leaders and soldiers have in fact bolstered the results above. Ultimately, the empirical results help create a narrative that supplements—but does not replace—leader experience and intuition.

1st Lt. Nicholas T. Calhoon is a U.S. Army infantry officer currently serving as a platoon leader in Comanche Company, 4th Battalion, 9th Infantry Regiment, 1st Stryker Brigade Combat Team, 4th Infantry Division. He holds a bachelor's degree in economics from the United States Military Academy at West Point, New York.

The Way Ahead: Driving Toward a Modern Army

These results would be a mere flash-in-the-pan without a clear road to follow them up, a compelling leader professional development session and little more. These results help us foster a feedback loop, driving constant iteration and improvement. Based on our work, the 4th Infantry Division revised its gunnery standard operating procedure to standardize data collection during mounted machine gunnery across the entire division, providing more complete and more robust datasets that will yield more results in future iterations. The Ivy Raider Culture Survey will be refined and disseminated bimonthly moving forward, providing routine snapshots that will verify our results and allow commanders to keep pulses on their unique unit cultures.

The RAID team is also not a special case that would fail in other organizations. Grassroots data analysis can be conducted in any tactical formation from the company to the division level. As stated above, the RAID team was born from only a few data-literate soldiers and officers in the 1st Brigade. Even with these individuals, we have barely scratched the surface to access the talent within our own brigade, as the RAID team has grown solely by word-of-mouth. Every brigade and battalion has access to diverse skill sets that could answer tactical questions with empirical evidence just as the RAID team has.

In the future, tactical data analysis could be leveraged on deployments and in combat to track enemy trends and enable rapid, focused decision-making. Officers in S-3 shops could analyze enemy rocket attacks and determine risk factors and statistical dangers with only a laptop. Commanders could determine where to most efficiently allocate combat power by recording simple data and discovering points to exploit in enemy postures.

Conclusion

Data analytics is not a panacea or crystal ball, but simply places another tool in a leader's kit bag, allowing them to detect otherwise unseen relationships between factors around them. Knowledge of these relationships—especially regarding something as intangible as unit culture—can inform faster and better decisions, moving us closer to decision dominance.⁹ Ultimately, data analytics strives to generate evidence allowing

leaders to achieve better outcomes more efficiently by revealing factors that drive readiness across the Army.

The results discussed in this article are not the final answer, but rather the beginning of a methodology and mindset that may help us answer important questions. Future unit culture surveys may undercut these results, causing us to critically question what we thought we knew to be true. Such results would be valuable, potentially suggesting that our environment has changed and that we must reprioritize our efforts.

More importantly, these studies shed light on how to truly care for soldiers by developing and inspiring

them. In theory, giving soldiers time off or light duty may seem like the right answer for a commander who wants to increase retention and reduce SIRs. However, if our research holds true, soldiers may be more driven by professional development and inspiring leadership than we think—a finding consistent with the “Army People Strategy.”¹⁰ The results of our grassroots data analysis sheds light on what it means to take care of soldiers and achieve the mission. The tools are within reach of all units; leveraging it is an important step toward becoming a more data-centric Army ready to win the next fight. ■

Notes

1. Josh Bowen and Jon Bate, “Cohesion, Performance, and Readiness: A Brigade-Level Experiment in the Art and Science of Organizational Culture,” Modern Warfare Institute, 29 March 2024, <https://mwi.westpoint.edu/cohesion-performance-and-readiness-a-brigade-level-experiment-in-the-art-and-science-of-organizational-culture/>.

2. Lauren C. Williams, “‘Moneyball’ for Gun Crews: Surprising Data Have Army Division Reshaping Its Gunnery Training,” Defense One, 1 September 2024, <https://www.defenseone.com/defense-systems/2024/09/moneyball-gun-crews-surprising-data-have-army-division-reshaping-its-gunnery-training/399227/>.

3. Anthony Keller, Jonathan Bate, and Brendon Wamsley, “Taking a Data-Centric Approach to Unit Readiness: Leveraging Analytics in a Brigade Combat Team,” *Military Review* Online Exclusive, 25 November 2024, <https://www.armyupress.army.mil/Journals/Military-Review/Online-Exclusive/2024-OLE/Data-Centric-Unit-Readiness/>.

4. Lauren C. Williams, “How One Army Infantry Division is Using Data Analytics to Keep Soldiers Safe,” Defense One, 20 August 2024, <https://www.defenseone.com/defense-systems/2024/08/how-one-army-infantry-division-using-data-analytics-keep-soldiers-safe/398949/>.

5. The IVY Arc is a framework after which the 4th Infantry Division models its leader professional development program, focusing on culture, creativity and innovation, and multidomain operations.

6. Taylor Graham, “The Project Prevention Journey: Raider Analytics, Innovation, and Data Team (RAID-T) Efforts to Forecast and Reduce Harmful Behaviors,” Army.mil, 18 April 2024, https://www.army.mil/article/275437/the_project_prevention_journey_raider_analytics_innovation_and_data_team RAID_T_efforts_to_forecast_and_reduce_harmful_behaviors.

7. Anyone who is interested in learning more about how we structured the culture survey can reference Bowen and Bate, “Cohesion, Performance, and Readiness,” which goes into greater detail.

8. The Likert scale is a scale that is used to measure subjective opinions, using options that range from “Strongly Agree” to “Strongly Disagree.”

9. Bryan Shone, “Enhancing Decisions with Data,” Association of the United States Army, 24 October 2022, <https://www.ausea.org/articles/enhance-decisions-data>.

10. “The 2020 Army People Strategy,” Army.mil, accessed 13 January 2025, <https://people.army.mil/>.