

THE DATA-DRIVEN DIFFERENCE



HOW SPARTA SCIENCE'S
MACHINE LEARNING TECHNOLOGY
HELPED THE AUSTRALIAN ARMY'S 3RD BRIGADE
REACH PEAK PERFORMANCE



SPARTASCIENCE



The Australian Army's 3rd Brigade was challenged by an issue common to military commands all over the world. A dozen Physical Training Instructors (PTIs) were tasked with overseeing the physical training and preparation of the many different units housed on base — a few thousand individuals, all of whom need to be ready for different types of deployment and roles. With such a limited staff and so many individualized capacities and requirements, the leadership needed a way to efficiently and effectively conduct the necessary physical training and preparation for deployment.

The assessments the Australian Army had previously relied on represented a classic trade-off: — in order to be deployed at scale, they had to remain rudimentary. With all the advances in health technology, the commanders sought out a more effective solution. That's when they found Sparta Science.

The Sparta Science technology flagged risks in recruits that otherwise may have gone undetected until it was too late. Consequently, the 3rd Brigade was able to bring health professionals on board and give their instructors the science they needed when talking to trainees — ultimately leading to smarter physical training.



DEPLOYING SPARTA SCIENCE

The 3rd Brigade began implementing the Sparta system in June 2019 as part of a three-year Injury Prevention Trial. They worked hand in hand with the Sparta Science Success Team to optimize the system for use in a conventional military setting.

The plan was to establish a systematic approach for assessing individuals, identifying risk, and providing a scalable solution to improve overall unit readiness.

The metrics for success were threefold:

- It had to work at scale
- It had to be clear
- It had to be portable

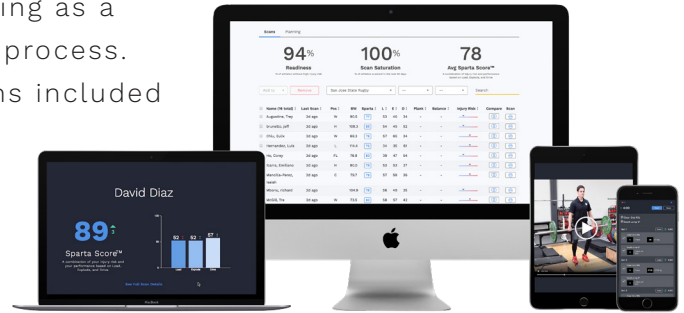
Soldiers were directed to perform the Sparta Jump Scan at a minimum of once per month to capture data about how the soldiers were moving and exerting force. The Sparta software then immediately ran this data through its cloud database of over 2 million scans, leveraging Force Plate Machine Learning™ to recommend specific interventions in training programs to be provided by unit PTIs (more details below).

Utilizing the outputs from the Sparta System, a traffic-light system (red, amber, green) was developed to identify individuals in need of further action. For example, if an individual is identified as red in three consecutive assessments (minor improvement), they report to their PTI for further evaluation, education, and potential referral to medical staff.

ONBOARDING AND EDUCATION

Sparta provided onsite, in-person training as a standard component of its onboarding process. These onsite in-person training sessions included education at multiple levels:

- Soldier engagement
- PTI/Physio engagement
- Unit Commander engagement



But in the military, people are always transitioning in and out. For Sparta to be a sustainable solution, new Brigade members would have to be educated on how to use the system. So Sparta worked with the 3rd Bridge to develop a custom online virtual training portal, allowing new stakeholders to get onboarded quickly at minimal cost.

THE RESULTS

A METRIC TO HELP PREVENT INJURIES

The Australian Army had been relying on two different assessments: the Basic Fitness Assessment (BFA) and the Physical Employment Standards Assessment (PESA). The BFA and PESA were effective but could not provide the level of diagnostic precision and analysis to differentiate among varied roles or truly improve performance. Moreover, they did not provide any insight to prevent musculoskeletal injuries — an endemic military challenge.

Readiness for any military group is negatively correlated with the amount and severity of musculoskeletal (MSK) injuries affecting its warfighters. Some individuals are at higher risk than others, but because of the size of conventional military units and the time and resource limitations, they are hard to identify in advance, let alone design interventions to mitigate that risk and improve overall unit readiness. Consequently, MSK injury risks are typically only identified after the onset of injury and addressed in a reactive-rehabilitative approach, instead of a proactive-preventative approach.

The Sparta system is designed to solve this problem. It instantly interprets individual time series data utilizing millions of other scans, resulting in digestible metrics and recommended actions. Our machine learning database gets smarter with every scan, improving the accuracy of its predictive capabilities and recommendations, and providing better information with every use.

CUSTOMIZED INTERVENTIONS

Once soldiers were assessed, they were categorized into one of five movement signature classifications. The PTIs adapted five different training programs to emphasize or deemphasize specific types of exercises individuals in that classification should perform. This allows individualization at scale by creating separate training programs for soldiers with similar strengths and weaknesses.



Moreover, Unit PTIs appreciated that they could use the Sparta results in conjunction with their preferred fitness and training framework — the Advanced Operational Conditioning Program (AOCP) — which emphasizes strength, mobility, and endurance. Results from the Sparta System allowed them to develop individualized training programs that aligned with its tenets and general process.

SOLUTIONS AT SCALE

The implementation of the Sparta Science technology provided a scalable and practical solution for a large organization like the 3rd Brigade to proactively address and mitigate injury risk at an individual level, leading to benefits across the military.

With 22 total systems, commanders could conduct efficient, assembly-line style mass assessments if required. Setting up multiple stations for a standardized warm-up and post-assessment data interpretation with a PTI created a simple, efficient, and practical way to assess large groups in minimal time. For example, the ability to evaluate 350 soldiers in 45 minutes shows the practicality in the military environment.

350 Soldiers x 2 minutes per test (jump only) / 22 Sparta Systems = 31.8 minutes

“Sparta has been the scientific glue that brings together adaptable and dynamic teams of Physical Training Instructors, Clinicians, and Commanders. We are incredibly thankful for this partnership as we continue to learn from each other.”

— Brigadier Scott Winter, Australian Defence Force representative at Joint Staff, Pentagon and Commander 3rd Brigade 2018-19



TRACKING AND REPORTING

The success of the 3rd Brigade's Injury Prevention trial hinged upon communication and collaboration among multiple different individuals to ensure the right actions were taken and strong accountability. The Sparta Science system instantly provided the right data in the right format to support these goals.

Sparta's platform collected and analyzed force plate data, translating it into meaningful metrics and actionable insights for PTIs regarding performance, injury risk, and corrective training. The data was automatically sent through API to Smartabase, an athlete management system, so it could be viewed in a central location, alongside data from other systems.

Furthermore, all Sparta data was aggregated and reported on a biweekly basis. This reporting allowed for both Brigade and unit oversight to track soldiers' overall compliance and results. These reports also provided meaningful, at-a-glance data, such as overall trends and comparisons among different units. With one click, a PTI or commander could drill down into a specific individual's data to observe longitudinal progress.

This reporting strategy led to a consistent and habitual approach to assessment and intervention.

EMPOWERING THE WARFIGHTER

The ease of assessment and intervention allowed for more frequent testing, leading to more soldier buyin. This created a direct connection between training and intended outcomes for each soldier and provided a stronger motivation for soldiers to participate in the voluntary training sessions. The visibility of the Sparta testing across the organization also helped to hold all parties accountable and aligned, improving overall outcomes.

RETURN TO READINESS

Sparta Science helped the Australian 3rd Brigade move past one-size-fits-all assessments to a more fine-tuned diagnostic approach that could identify risk and mitigate injury, while providing individualized training guidance and improving overall performance. The Sparta Science system could be efficiently and rapidly deployed for thousands of soldiers, allowing for increased testing frequency, which was a significant individual motivator. Moreover, the ease of Sparta's use and commitment from the Sparta team allowed the system to be adapted for specific military needs, such as working within established training frameworks and providing for ongoing education as new military members transitioned into the Brigade.

"I knew it was going to be good in terms of the intervention, but when I went down and watched some of the first soldiers being scanned, and their eyes lit up because they could see that they were being invested in personally."

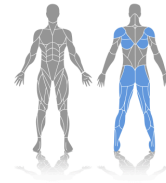
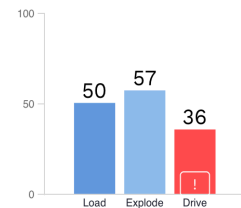
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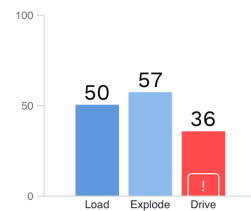
What is Drive?

A measure of your force to finish a movement - how effectively do you prolong force?



Common Issues when LOW

JUMP

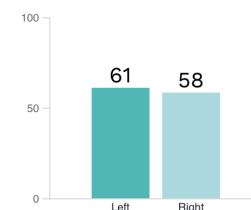


Recommended Focus: **Drive**

The Movement Signature represents an athlete's force production qualities during the jump to determine injury risk and performance traits.

Updated: 02/21/20

PLANK



The Plank Scan represents an athlete's static stability on their left and right sides. Used to determine return to play stages after upper body injury.

Updated: 10/03/19

BALANCE

