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EDITORIAL

FROM METRICS TO MEANING: REFRAMING THE USE OF PERFORMANCE DATA IN HIGH-STAKES ENVIRONMENTS

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ABSTRACT

In both elite sport and military settings, the proliferation of data collection technologies has led to an era of unprecedented measurement, but not necessarily better decision-making. We challenge the current fixation on data volume and precision, arguing that without context, interpretation and narrative, performance metrics risk becoming a distraction rather than insight. We propose a reframing of how data is used: from passive recording to active sense-making. By prioritising meaning over measurement and fostering fluency within multidisciplinary teams, clarity and purpose can be restored to data-driven performance systems. This paper outlines a new framework for using performance data in high-stakes environments, centred around five key principles to encourage 'leading with questions', 'measuring what matters', 'personalising the picture', ensuring that 'context is king' and promoting a process of 'shared interpretation'. This framework therefore proposes that insight, not information, must become the driver of action for performance practitioners.

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INTRODUCTION: THE DATA DELUGE

In the world of human performance, whether on the sports field or the battlefield, we now recognise that excellence relies not only on physical capacity but also on psychological preparedness to perform under pressure [1,2]. To better support these individuals, data is now ubiquitous. Wearables, global positioning satellite (GPS) trackers, wellness surveys, force plates and algorithms offer real-time insights into everything from stride length to sleep quality [3,4]. The premise is compelling: if we can measure it, we can manage it; but the reality is more complex. While the volume and granularity of data have skyrocketed, the translation of that data into meaningful, actionable decisions has not kept pace [4]. In high-stakes environments, such as elite sport and military settings, the consequences of this gap are significant. Athletes and soldiers alike are being monitored more than ever, but performance improvements or injury reductions are not guaranteed [4,5].

We argue that the solution is not more data, but the better use of data. To make performance monitoring truly impactful, we must move beyond raw metrics and begin crafting meaning.

MEASUREMENT VS. MEANING

Performance science is often captivated by precision. The idea that every variable can be tracked, trended and optimised creates a sense of control. However, data alone does not confer understanding. A single metric, for example, a reduction in sprint speed or an elevated rate of perceived exertion, means little without narrative context. Was the athlete sleep-deprived? Did the soldier just return from a high-stress deployment? Is the load typical or anomalous? Without connecting metrics to behaviour, decisions and outcomes, we risk generating what one might call 'performance theatre'; a system that looks analytical on the surface but is hollow at its core. Similar concerns have

been noted in elite football, where extensive monitoring has not always translated into genuine insight [4].

In the context of injury risk and rehabilitation, the limits of data without meaning become especially clear. Load monitoring systems and alerts driven by Artificial Intelligence (AI) often ignore context, which may raise misleading flags [6]. Tools such as readiness dashboards offer a veneer of precision but often ignore qualitative and individualised nuances, such as psychological state, injury history, nutritional habits, sleep quality and home-life stressors. These factors can shape how individuals respond to training stimuli, meaning that identical workloads can yield entirely different outcomes in risk and recovery [7,8,9]. Injury risk is not always visible in the data and recovery is rarely linear. Without integrating subjective insight and practitioner judgment, there is a danger of both false reassurance and overreaction.

LESSONS FROM INTELLIGENCE AND MILITARY THINKING

The military offers a useful analogy, which performance teams could learn from. Intelligence gathering is only useful when it leads to actionable insights. Collecting more surveillance footage or satellite data does not automatically result in better strategy. Analysts must sift through noise, identify patterns and provide commanders with recommendations that are both timely and trustworthy. Performance professionals should be doing the same. In military terms, we need less 'sensor fusion', the integration of vast, often unfiltered data, and more 'sense-making', the synthesis of context-driven intelligence that directly informs decision-making. Just as intelligence operatives build contextual pictures from scattered data points, performance teams must learn to create coherent narratives from physiological, biomechanical and psychological data.

THE PRACTITIONER AS A TRANSLATOR

This demands that the practitioner assumes a new identity, that of a translator. They must learn to speak multiple languages: the language of data, the language of coaching and the lived language of the athlete or soldier. It is not enough to present dashboards or z-scores. They must tell stories that resonate with decision-makers, whether they are strength and conditioning (S&C) coaches, sports scientists, performance analysts, technical coaches, military commanders or the individuals themselves. This also requires bridging disciplines: a nutritionist should understand what implications load data has for fuelling strategies; a physiotherapist should be able to consider psychological wellbeing in conjunction with rehabilitation timelines. Effective multidisciplinary practice relies on shared mental models: collaborative decision-making and communication across domains [10,11]. Therefore, shared mental models must replace siloed expertise.

A FRAMEWORK FOR MEANINGFUL MONITORING

To operationalise a shift from descriptive monitoring to interpretive decision-making, we propose the Meaningful Monitoring Framework (MMF) (Figure 1), built around five principles. It is intended for use by applied practitioners, multidisciplinary performance teams and researchers working in both elite sport and military settings.

1. **Lead with questions.**

Start with the question, not the technology. Before deploying a new tool or metric, ask what decision it will inform. Without a clear purpose, even the most advanced technology risks becoming an expensive, time-consuming distraction. The proliferation of data-collection technologies makes it tempting to measure everything that is available. For example, a coach may run a full battery of tests, assessing everything from body composition and reaction time to aerobic capacity and rate of force development, before considering what is actually required. If the goal is to assess readiness for sprinting after a hamstring injury, focused measures investigating speed, asymmetry and eccentric strength would be far more valuable.

2. **Measure what matters.**

Limit what you collect to what you can use. Data has a cost. Every additional metric should earn its place by proving it can drive better decisions and, importantly, improve

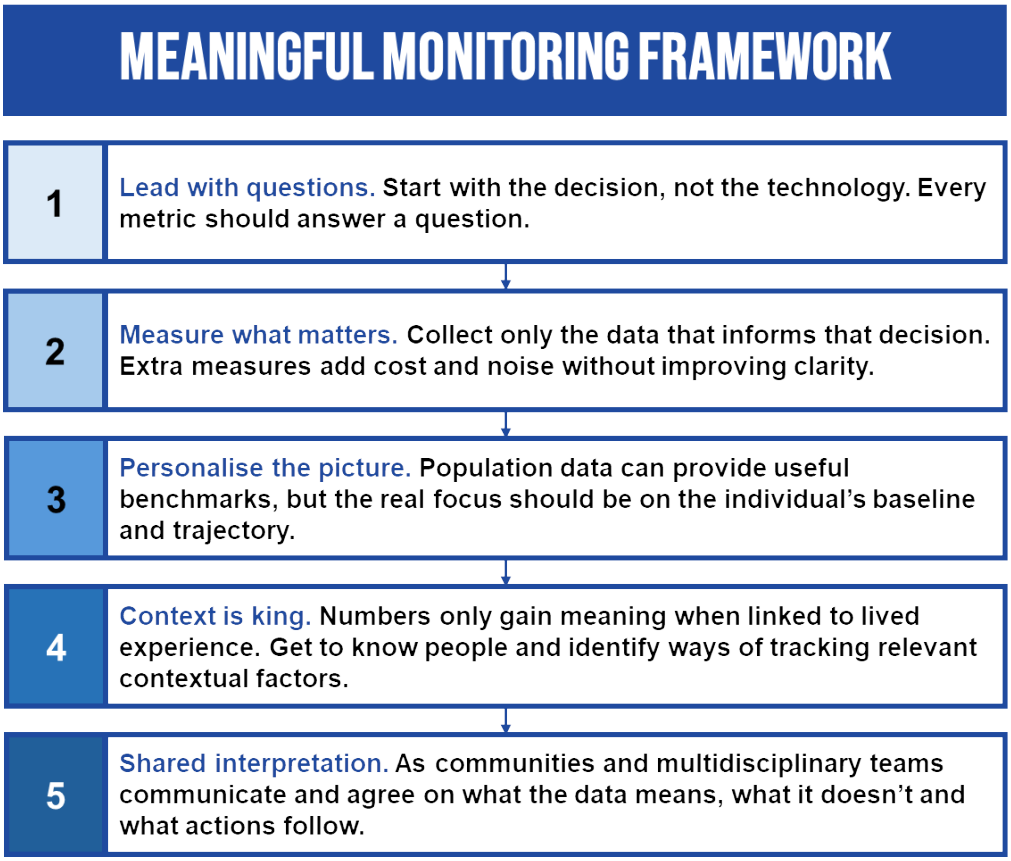

FIGURE 1. The Meaningful Monitoring Framework.

outcomes. Without such discipline, we risk undermining the goal of informed, effective decision-making, frustrating the individuals we are there to support.

In sports such as football, for example, coaches and sports scientists often collect a wide range of GPS data without focusing on the metrics which truly matter [3,4]. Total distance covered, for instance, may appear informative, yet evidence suggests that the most relevant indicators of injury risk are found in the volume and management of high-speed and sprint running exposures [12].

3. Personalise the picture.

Whilst normative data can be a useful benchmark, it should not be relied upon too heavily as it risks obscuring what matters most: the individual's trajectory. Understanding how someone is evolving, based on their own baseline, is far more important than where they sit within a range. Good practice involves practitioners analysing the data that has been collected and providing clear, actionable and bespoke feedback to athletes and other decision-makers. For example, a practitioner reviewing sprint performance might note that an athlete's top speed is comparable to the team average, suggesting that no action needs to be taken. However, there may be a significant reduction when compared to their previous data, indicating overload, fatigue or a reduction in fitness.

4. Context is king.

Triangulate data with lived experience. Integrate subjective feedback, observational insight and contextual factors. Numbers only truly become meaningful when grounded in the realities of what the individual is doing and feeling. Distances commuted, lifestyle and health behaviours, stress management and nutritional intake may be more important than the daily objective markers collected in training [13]. For example, two athletes may have completed identical training sessions and recorded identical training loads. However, it is not just the intra-session load that matters. If one lives locally with strong social support, while the other faces a three-hour commute and irregular sleep patterns, their objective numbers are the same, but the contextual demands are very different, and so are the implications for performance and recovery.

5. **Shared interpretation.**
Create shared mental models. In order to achieve best practice, practitioners and decision-makers must develop common understandings of what the data means, what it doesn't and what actions follow. This will require ongoing dialogue, transparency in assumptions and the willingness to challenge and adapt interpretations as lessons are learnt. In rugby, for example, higher contact loads during both training and matches have been shown to result in an increased risk of injury [14]. However, different practitioners may act on this information in isolation: an S&C coach might recommend additional isometric neck strengthening, a sports scientist may prioritise extended recovery protocols and a technical coach could look to adjust the frequency or intensity of contact drills. Unless these perspectives are aligned, teams risk pursuing well-intentioned, yet conflicting, strategies.

A CASE FOR LEANER EVIDENCE

The MMF does not reject technology, but re-centres its purpose. Large datasets are often defended for their longitudinal value. Over time, they can reveal important trends but, in practice, decisions are seldom updated with each new cycle. Injury is a reminder of this gap: despite decades of increasingly sophisticated surveillance, rates remain stubbornly high [5,15]. This reveals the limits of data collection without action. Long records may exist, yet relevance and timeliness usually matter more than sheer duration.

Another common rationale is to collect data 'just in case'. The argument is that future tools, particularly AI, will uncover insights we cannot yet see. There is merit to this position: tomorrow's questions may be different from today's, and large datasets could prove valuable in answering them.

However, this is only true if the data being collected are of sufficient quality. Poorly measured, inconsistently labelled or context-free data will not help train AI, nor will they allow us to learn meaningful lessons in the future. Collecting more data can be justified, but only when it meets clear standards of accuracy, consistency, informed consent from those being monitored and contextual relevance.

Technology also moves quickly; what seems essential today may be irrelevant tomorrow. As every extra survey or sensor demands time, practitioner bandwidth and buy-in from those being measured, stockpiling data can create the illusion of preparedness while neglecting the present. Even as AI evolves, it cannot remove the need for human context as algorithms may detect patterns, but it is people who decide how patterns shape action. Leaner evidence does not mean rejecting ambition. It means prioritising purpose, ensuring that data systems serve performance and not the other way around.

CONCLUSION: INSIGHT OVER INFORMATION

The framework outlined in this paper offers five key principles: 'leading with questions', 'measuring what matters', 'personalising the picture', ensuring that 'context is king' and promoting 'shared interpretation'. These principles aim to shift practice towards a culture of meaning, where data is not collected for its own sake but translated into shared understanding and purposeful action. Applying this framework would see practitioners let the question or desired outcome guide data collection, reshape dashboards from descriptive displays into decision-making tools, place the individual and their context above population norms and foster true integration within performance teams. The challenge is not whether to collect more data, but how to use it with clarity, context and coordination so that performance systems move from metrics to meaning.

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