

# SMART USE



**Mark Homer**, Lead Scientist with the GB Rowing Team, discusses the pros and cons of using technology to monitor your performance

**M**ost athletes like numbers. Whether it is counting kilometres, reductions in resting heart-rate, or improvements in maximal power, rowers in particular love to quantify all the aspects of their performance besides the time it takes to cover 2,000m.

So what advances in technology can help – or not – in monitoring and testing your training and performance, from a physiological perspective?

Ideally, you require information on how fast you went, how hard it was, and how well you recover from it. Therefore, we should initially discuss ways of monitoring your speed or power.

A fair percentage of you are probably reading this article on your smartphone or tablet – a device that I am told has more computing power than was used to get Apollo 11 and its crew to the moon in 1969.

The GPS capabilities and built-in accelerometers allow a fantastic amount of

data to be collected and analysed in many ways. Speed, pace, and distance are the primary variables provided by the large collection of apps available. Such software has been embraced by the running and cycling communities and could provide excellent cross-training feedback, alongside a record for you and your coach. The ability to share data and compete against friends and strangers alike provides excellent motivation in the winter or during a rehab programme.

The application of these apps to rowing is less widespread, although some are available. A rowing-specific SpeedCoach avoids the need to risk your phone on the water (they do not float – trust me). These are available with impeller-based speed measurements (which account for water flow) or a GPS (giving a measure of actual speed). You must therefore consider the strengths and weaknesses of using actual or adjusted speed data to monitor your training.

Now we have an accurate measure of your output, we need to know the physiological cost of achieving it. Sports science – and in particular our



Putting in the training



Number crunching

**“The truest and most important measure of your performance can be recorded with a stopwatch or on a rowing machine monitor”**

understanding of the body's responses and adaptations to exercise – have developed rapidly in the last 50 years. Since the work of Dr Griffith Pugh and Professor Craig Sharp (two of the forefathers of sports science as we know it) the equipment used to measure and monitor physiological determinants of performance has moved from bespoke prototypes developed in (and often filling) academic laboratories, to widely accessible (and often handheld) devices and software. Such technology can provide instantaneous feedback to a scientist, coach or athlete regarding their physiological condition in the short and long term.

In terms of the commercially available, the most

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popular device in the fitness market is the heart-rate monitor. For some reason, and don't ask me why, the Finnish produce the most popular brands of heart-rate monitors. These range from simple strap and watch 'display only' units that can be purchased for under £40. As the features increase, the price follows. A top of the range integrated GPS with a waypoint route navigation watch and strapless technology will cost hundreds of pounds – yet many of the features will not lend themselves to rowing.

Heart-rate monitoring is a useful tool to record training intensity, particularly when combined with a measure of work done – for example an ergometer split. Simple monitoring rules to improve consistency will help maximise the effectiveness of its use (see page 62 of the August issue of R&R). For instance, a regular session performed at the same time of day in similar conditions at the same intensity will allow you to better track changes in the heart-rate response to training – and help you assess your current condition.

Top of the range heart-rate monitors claim to explain and predict several aspects of your

physiology, normally through 'heart-rate variability' – the subtle difference between heartbeats that reflect the actions of the sympathetic and parasympathetic nervous systems (part of the autonomic nervous system). Research supporting the use of heart-rate variability is increasing, although the 'black box' nature of the algorithms used to calculate 'recovery' or 'stress' scores are a well-guarded secret of the equipment manufacturers.

But what are the potential hazards of using such technology? Much of the commercially available technology to 'improve' sports performance is now cheap and accessible. In order to make this possible, the technology used often relies on assumption and indirect measurement of physiological processes.

This can lead to errors in the calculation of variables – the results may not be entirely accurate, but as long as they are reliable they can be used to track change.

However, inconsistent errors can lead to misleading results. Therefore, one should be wary of equipment that claims to 'measure' variables

that are normally assessed directly. An example includes smartphone-based sleep monitoring apps that claim to provide an accurate analysis of accelerometer data collected from subtle movements in a mattress during the night.

In the lead-up to the 2012 Olympic Games, I was contacted countless times by salesmen suggesting I try a piece of equipment that could improve an elite rower's performance by anything from 1% to 5%.

Any such gains are nonsense, both in the professional and amateur environment. While such technologies can assist you in monitoring the effectiveness of your programme, they are no replacement for actually doing the training – a fact often lost on athletes with some money to spend and a love of numbers.

So while devices and apps can help inform what you do, be wary of reading too much into predicted measurements which rely heavily on assumptions not specific to you. The truest and most important measure of your performance can be recorded with a stopwatch or on a rowing machine monitor. □