Sheffield Hallam University

Chasing that extra second and inspiring a nation

We'll help you deliver success in sport

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Networks, experts and *knowhow*

We share your enthusiasm for sport. Drawing on our leading research and considerable expertise, we can help you drive the industry forward – from grass roots through to Olympic level. Tap into our brightest minds and cutting-edge facilities to deliver your whole sport plan.

Together, we can help individuals to succeed and teams to excel. Whether we're working with athletes or coaches to improve technique or collaborating with sports manufacturers to enhance equipment, our expertise could be the difference between winning and losing.

Widening participation in sport is also firmly on our agenda. We can help you understand which investments will deliver the best returns, determine what actions will bring about changes in behaviour and measure the impact to inform future decisions.

Opposite page: **1.** Dave Hembrough - Sport and exercise science **2.** Tim Vernon – Sport and exercise science **3.** Rob Wilson – Sport Management
4. Dr Helen Crank – Physical activity and health **5.** David Curtis – Sports engineering **6.** Dr David James – Sports engineering **7.** Guy Masterman – Sport management and education
8. Maxine Gregory – Sport industry research **9.** Dr Simon Goodwill – Sports engineering **10.** David Barrett – Sport industry research **11.** Professor Ian Maynard – Sport, exercise science and wellness
12. Professor Simon Shibli – Sport industry research **13.** Dr Jeff Breckon – Sport and exercise psychology **14.** Christina King – Sports engineering **15.** Professor Steve Haake – Sports engineering

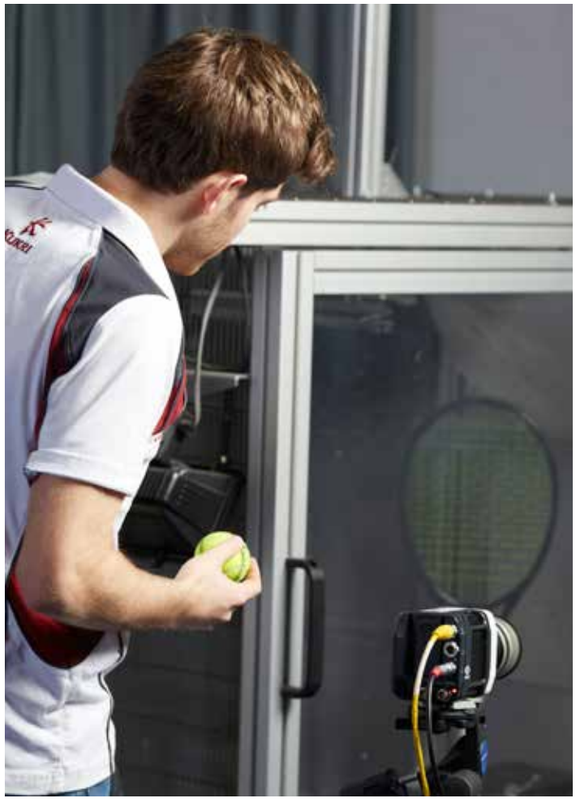
Access expertise *that explores sport from every perspective*

The breadth of our expertise makes us unique. Our Academy of Sport and Physical Activity includes specialist teams in sports engineering, exercise science, nutrition, economics and education. When you're working with us, you're working with a partner that understands the whole business of sport.

Our expertise can be applied in a multitude of ways, from improving athletes' performance, to product analysis and testing and research into the economics of the sport industry.

We're also one of the largest providers of sport education in the UK. So we have the knowhow to improve the skills that are vital for enhancing sport – such as coaching, leadership, event management and marketing.

Opposite page: We have the expertise and facilities to provide high-quality sport science support programmes



Helping you *go the distance in sport*

We can help athletes reach their targets by working with them to

- improve performance and endurance and reduce injury
- develop mental toughness and deal with anxiety and stress
- increase confidence, enhance motivation and set goals
- manage weight and nutrition
- develop leadership, coaching and teamwork skills

We can help your organisation achieve its goals by working with you to

- improve sports equipment
- create coach education materials
- identify and develop talent
- understand sporting environments
- increase participation in sport
- enhance your workforce through professional development and training
- recruit, manage and train volunteers
- demonstrate the value of sport in economic and social terms
- manage and analyse data
- protect and enhance your investments
- gain insights that add value to your business

Specialist services *that enhance performance and participation*

Our services can be divided into sport performance and sport participation, helping you deliver your whole sport plan. Regardless of the service we provide, we can evaluate the return on your investment so you can make informed choices in the future.

Sport performance

1 Athlete and team support

- bespoke sport science support programmes
- profiling of physical, mental and technique attributes
- performance analysis systems development
- intervention development and evaluation of effectiveness
- coaching provision audit
- athlete screening
- nutrition for performance

2 Training and development

- applied sport science workshops
- training in areas of expertise
- coach and player development
- bespoke CPD
- organisational management
- sport coaching postgraduate diploma/masters
- UKCC level 4
- lifestyle management
- coach development strategies
- target setting
- media and event management training and modelling

3 Innovation and research

- product testing and research
- technical equipment analysis and development
- video and performance analysis
- Infostrada database

4 Evaluation

- strategic development
- eventIMPACT
- survey design and processing
- programme evaluation
- elite sport climate evaluations
- sport data mapping
- social return on investment analysis

Sport participation

1 Athlete and team support

- intervention development and evaluation of effectiveness

2 Training and development

- training in areas of expertise
- coach development
- bespoke CPD
- organisational management
- sport coaching postgraduate diploma/masters
- UKCC level 4
- data analysis training
- facility management improvement
- facilitation of consultation
- training in SE strategic planning tools
- volunteer training
- sport development training

3 Innovation and research

- product testing and research
- technical equipment analysis and development

4 Evaluation

- strategic development
- eventIMPACT
- survey design and processing
- programme evaluation
- sport data mapping
- social return on investment analysis
- elite sport climate evaluation

Leading facilities *that help you achieve your goals*

Our research, consultancy and teaching is conducted in our world-class facilities, including some of the best laboratories in the UK. We also have a campus at the English Institute of Sport Sheffield which contains some of the country's finest sporting facilities.

Facilities at the University include

- a biomechanics laboratory containing bowlers and cannons, an impact rig, motion capture equipment and computational fluid dynamics (CFD) simulation facilities
- two physiology laboratories
- a physical activity laboratory
- non-contact laser scanning lab
- an electronics workshop
- an environmental chamber
- a manufacturing and prototyping workshop
- computer rooms and video analysis technology
- high specification computer cluster for sports simulation purposes
- gyms and sports halls
- a physiotherapy suite
- various strength and conditioning suites

Our computer software includes

- finite element analysis facilities
- MATLAB and .NET programming
- geographic information systems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Opposite page: **1.** Motion capture technology in our biomechanical laboratory **2.** Product testing and research **3.** English Institute of Sport Sheffield **4.** Our physiotherapy suite

Cutting-edge innovations by our sports engineers *help GB's elite win more medals*

In their quest for GB medal success, the English Institute of Sport recognises that an innovative approach to sport technique and equipment can significantly enhance performance. As such, it's working with partners to harness the best of British expertise. We're one of only four universities taking part in the programme, and we've made significant impact since our involvement began in 2008.

The programme is focussed on bringing external expertise into the UK elite sport system, building on existing skills and knowledge to solve specialist performance needs. These may relate to athlete equipment and accessories, coaching techniques, the science behind training and medical management.

So far, our sports engineers have worked with swimming, boxing, diving, gymnastics, taekwondo, cycling, hockey, canoeing, snowboard, skeleton bobsleigh, speed skating, judo and curling. Our innovations have included Thor – a unique performance analysis tool that tracks the hammer in 3-dimensions through the net, iCurl – a bespoke tool for curling match analysis, iDive – a video capture and instant replay system for GB Diving, and SwimTrack – an underwater portable video capture system.

One of our key successes, led by one of our senior sports engineers, is our iBoxer video capture system which won the Best New Sports Technology category in the MBNA Northern Sports Awards in 2012. Located in the GB Boxing Hall at EIS Sheffield, the system uses a series of cameras to monitor boxers' movement in the ring, which is fed directly to a series of touchscreen monitors in the gym. The athletes then go over the footage between bouts in order to analyse and improve performance, define fight strategy and gain a better understanding of their opponents' tactics.

This is accompanied by the iBoxer database containing judges' scores and videos for thousands of bouts, which can easily be searched using a laptop or touchscreen PC.

The iBoxer system is unique in world boxing and has been well received by the Team GB boxers, who have been using performance analysis for some time to help inform strategy and tactics at major championships.

'Our work sets out to help our athletes and their coaches learn faster than their international opposition, and this is a great example of where increasing knowledge and understanding of the sport can give our athletes a real performance edge.

'I'd like to thank our innovation partners at Sheffield Hallam University for making this possible and congratulate them on this well-deserved award.'

Dr Scott Drawer, head of research and innovation at UK Sport

With the help of our sports physiologists and psychologists, *football referee Howard Webb was at the top of his game for the 2010 World Cup.*

Referee Howard Webb called on our experts to help him prepare for the 2010 World Cup in South Africa to ensure he could perform mentally and physically at altitudes of up to 6,000 feet.

Simon Breivik, head sport scientist at the Professional Game Match Officials Board, enlisted our help with acclimatising Howard as he prepared to meet the challenging conditions – which could range from high-altitude to below sea level within a matter of days as he travelled between different stadia.

We devised an intensive three-week training programme, including time in our purpose-built environmental chamber to simulate the conditions he would face. Using the GO2Altitude system – which can replicate altitudes nearing Everest – we applied intermittent hypoxic treatment (IHT) in short bursts to simulate the oxygen availability at high altitudes, bringing him back down to sea level to allow him to recover.

After a few sessions, we integrated this with the physical training he'd already been doing in our strength and conditioning suite, delivered oxygen at concentrations equating to various altitudes while Howard exercised on a treadmill. We simultaneously monitored his blood oxygen, heart rate and his perception of his exertion until we were satisfied that he'd acclimatised to the conditions he was about to face.

Our sport psychology team also worked with Howard to build his confidence and his focus. The psychological training involved sessions with his two assistants that focused on goals, roles and communication to maximise the effectiveness of their working relationship.

As a result of working with us, Howard felt that he was better acclimatised than most of the other referees taking part in the World Cup. This gave him a physical advantage and a psychological advantage, enabling him to maintain an optimal distance from play, make better decisions and improve his overall performance.

Howard enjoys an on-going relationship with the University, and having been shortlisted for Rio 2014, he'll spend time with us going through a similar preparation programme to make sure that once again, he's at the top of his game.

'I very much appreciated the preparation that the University's Centre for Sport and Exercise Science provided for me in my build-up towards the World Cup in 2010. I felt the acclimatisation work I did in the environmental chamber and the on-going sport psychology programme that I completed with Professor Ian Maynard, gave me a physical and psychological edge over all the other referees at the tournament, and may have gone some way to helping me get the final.'

Howard Webb, World Cup Referee

Working with a team of our dedicated researchers, *England Athletics are now on the right track to success.*

Developing, conditioning and retaining young athletes to give them the best opportunities to succeed are key challenges faced by the sport. So in 2011, England Athletics asked us to undertake a study to ensure that their efforts were being invested with the long-term interests of young athletes in mind.

Our researchers began by looking at secondary data to identify the age athletes achieve peak performance, retention rates in young athletes and progression rates. They also used the Power of Ten database – England Athletics' athlete performance information system – to track young athletes from 2005–2010 to quantify retention and progression as measured by improved relative performance and improved absolute performance.

In addition, they interviewed current athletes, former athletes and current coaches about their early experiences, their training and competition environment, their training commitment and their support networks and systems. This enabled them to find 'softer' meanings, such as why some people progress whilst others drop out.

Our research provided a basis for England Athletics to evaluate and inform existing as well as future policy. The report our analysts produced provided a retrospective justification for certain actions that have been taken in previous years – notably around the UKA Athlete Development Model.

The report also provided a basis for more confident strategic planning in the future. Our analysis of the critical success factors revealed some interesting insights into what athletes and coaches consider to be important to success. Of paramount importance is the human infrastructure surrounding an athlete. The starting point must be that the motivation to achieve an athlete's potential comes from within. Assuming the motivation is there, potential can be realised by effective coaching and a supportive network of family and friends. Whilst access to facilities, support services and funding are also identified as being important, they are less important than the human infrastructure.

As a result of our findings, England Athletics now has a much clearer understanding of what it needs to know in order to develop strategies that are in the best long-term interests of the sport.

'The report provided both detailed insight and interactive analysis into the major factors affecting transition from junior participation to senior success in what is traditionally a late development sport. The report has helped to inform, underpin and proof our existing and future policies/programmes aimed at coaches, competitors and clubs with long-term athlete development at the forefront of our minds.'

Chris Jones, chief executive England Athletics Ltd

Our research designers, field workers and data analysts identified lessons from Everyday Swim, *helping the sport stay at the top of the nation's leader board.*

We evaluated the Everyday Swim project on behalf of Sport England and the Amateur Swimming Association from 2006–2010. Everyday Swim was a pilot scheme designed to increase participation in swimming at local authority level. In addition to understanding the impact of the programme, the lessons learned from the project would be shared with authorities across the country to increase participation on a national level.

We began by distilling key market intelligence about swimming into easily understood and location-specific reports. This enabled local coordinators to get their ideas to market as quickly as possible – and ensured that interventions designed to get more people swimming were based on the best available evidence.

We then worked closely with the project coordinators to evaluate the programme's success. As well as monitoring levels of participation in the pilot areas, the aim of our research was to analyse trends that could be linked to the Everyday Swim programme, and identify good practice that could be shared with swimming providers across the country.

Our data analysts found that the eight pilot Everyday Swim projects had resulted in an overall increase of more than 10,000 new adult swimmers in the relevant authorities, which was counter to the national trend of static participation in swimming.

Our analysis also revealed very strong evidence that the demand for swimming is highly dependent upon supply. This finding encouraged some local coordinators to open up pools on school sites for public use.

Most importantly, our evaluation brought to light three broad themes that formed a blueprint for driving forward the delivery of swimming and increasing participation. These were

- structured sessions, particularly lessons for the 20% of adults who cannot swim
- creative marketing beyond the four walls of swimming pools
- a culture change in all aspects of service delivery

These themes are still valid today and help underpin the Amateur Swimming Association's strategy to maintain swimming as the nation's most popular sport.

Bespoke workshops developed and delivered by our sport lecturers *help school sports coordinators improve their management and leadership skills*

The Youth Sport Trust (YST) is responsible for the professional development of its national network of school sport co-ordinators (SSCOs). The trust wanted to outsource some of its management training, and also link the training to an accredited, postgraduate course to give delegates the opportunity to progress their careers. As such, they asked us to develop and deliver a series of bespoke workshops for 60 SSCOs based in Yorkshire.

Our sport lecturers developed three workshops that aligned with a professional development module within two of the University's degrees – the MSc in Leading and Managing in Sport Development and the MSc in Leading and Managing PE and School Sport. The workshops, focusing on managing and leading people, partnerships and projects, were delivered by our lecturers in three centres across the region over the academic year.

Delegates attending all three workshops were then able to apply for accredited recognition of this learning, enabling them to progress onto the MSc after completing an assessment.

The programme was highly praised for delivery and content. Participants found that the bespoke course materials centred on real issues that they faced on a daily basis, so they could apply what they had learned to their roles. Particular areas of interest included time management, learning styles, team types, understanding partnerships, and using different types of language and communication.

The YST appreciated the additional credibility associated with a university, and the SSCOs felt valued because they were given the opportunity to turn their attendance into credits within a university setting. On the final training day, over half said they intended to pursue the masters degree offered.

The sessions also provided a networking opportunity and enabled conversations about local issues.

'There is a definite change in my thinking and how I'm working with my teams and just a more strategic level of thinking really.

'It should be compulsory that SSCOs have to attend this sort of course because our partnership development manager, with all the best will in the world, couldn't cover it as well as what's been covered here.'

School Sport Co-ordinators who attended the course

A team of exercise science experts with a vision to tackle obesity *empower the people of Barnsley to lead a healthier life*

In 2008/9, Barnsley was identified as a borough of poor health with a high majority of the population estimated to be overweight or obese. A Sport England survey of physical activity indicated that only 19.1% of its residents took part in regular sport or active recreation. As a result, NHS Barnsley took on the challenge of increasing health and physical activity in nine of its most deprived areas, and asked us to devise a programme to help them achieve this goal.

In consultation with the target population, our exercise science experts developed the innovative physical activity intervention BeActive. The programme delivered a number of outputs – including physical activity provision, weight management groups, one-to-one support, DVD distribution, training and a community garden.

BeActive delivered 2,540 hours of physical activity provision plus open access to swimming and had almost 25,200 attendances. Provision was continually informed by public consultation, which formed an integral part of empowering local communities.

A highlight of the intervention was the interactive DVD our experts created which proved to be very effective with this hard to reach audience. Over 5,000 were distributed, acting as an effective engagement tool. 96% of evaluation respondents reported that they were more motivated to become active, while 93% self-reported that they were more physically active as a result of interacting with the DVD.

During the BeActive delivery period, the percentage of adults in Barnsley participating in 30 minutes' of physical activity three times per week increased from 19.1% to 22.4%. Alongside this, obesity levels reduced by 0.1%, going against the upward national trend. The programme also had a positive impact on the weight, blood pressure and body composition of participants.

'Over the two and a half year programme BeActive membership grew to over 7,000 people. This was a considerable achievement, bearing in mind that all of these people were considered to be hard to reach, as a stipulation of the programme was that activity should be concentrated in nine of the most deprived areas of the borough.'

Paul Simpson, head of sport and active recreation, Barnsley MBC

Experimental and computational techniques used by our sports engineers help to create a new shuttlecock and a new game. *Outdoor badminton is now poised to boost sport participation.*

As a result of being set tough targets for increased participation, Badminton England decided to develop a quality outdoor version of the sport in order to reach a wider audience. The idea was that the game could be played in the same manner as the traditional game, without being overtly influenced by environmental conditions.

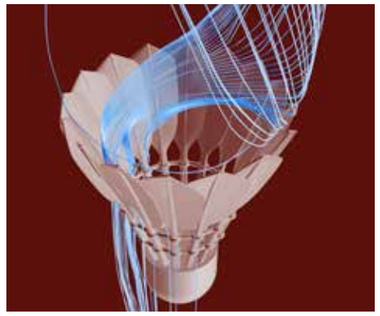
Badminton England enlisted our sports engineers to help them conduct an initial feasibility project funded under the HEFCE Knowledge Exchange scheme. This considered various concept designs, and investigated the potential market for an outdoor shuttle.

They also completed a review of existing outdoor products along with a patent review, plus a detailed analysis into the flight and behaviour of traditional design shuttles, performed using both experimental and computational techniques. Shuttle flight trajectories, spin rates, and turnover were captured using high-speed video equipment. Plus the geometry of the shuttle was reverse engineered using in-house specialist measurement equipment, enabling an accurate CAD model to be created.

This information was then analysed using computational fluid dynamics to gain an understanding of the drag and lift characteristics of the shuttle throughout its flight.

Using the knowledge gained, our sports engineers produced a basic prototype model for an outdoor shuttle using traditional model making methods. This allowed the potential flight behaviour of the prototype to be analysed.

As a result of this work, our joint application with Badminton England to the Sport England Innovation Fund was awarded £610,000 to continue the work – only the third innovation project to be funded. This enabled our sports engineers to develop a whole outdoor game concept, going beyond the technical development of an outdoor shuttle to include game equipment. The design of the shuttle has advanced to a point where it has been proven to be less wind affected than traditional designs during outdoor play. Work is now at an advanced stage of product development, and these products are anticipated to result in significant participation increases.



'The HEFCE-funded project has enabled the investigations of a new paradigm for the sport of badminton. The concept study directly contributed to securing further funding through the Sport England Innovation Fund. This will allow us to find a solution to the issue of limited indoor facilities which is one of the greatest challenges in growing the sport of badminton.'

George Wood, head of development, Badminton England