SUPPORTING A UK SUCCESS STORY:
THE IMPACT OF UNIVERSITY RESEARCH AND SPORT DEVELOPMENT
ABOUT US

UNIVERSITIES WEEK
Universities Week 2012 runs from 30 April to 7 May and will recognise and celebrate the contribution that universities make to the Olympic and Paralympic Games, as well as the wider sports industry in the UK. This is showcased through universities’ support of Great Britain’s top athletes, the development of world-class research, the provision of sporting facilities for students and local communities, university-led Cultural Olympiad projects and the army of volunteers from universities around the UK who will make the logistics of the Games possible. Universities Week will culminate in the BUCS Visa Outdoor Athletics Championships, which will form a London 2012 test event as part of the London Prepares Series.

Further information can be found at www.universitiesweek.co.uk

The campaign is being coordinated by Universities UK and British Universities & Colleges Sport (BUCS). It is supported by universities across the UK and a wide range of organisations including Podium, the National Union of Students (NUS), Research Councils UK, GuildHE, the Universities Marketing Forum, Higher Education Funding Council for England and many more.

UNIVERSITIES UK
 Universities UK is the representative organisation for the UK’s universities. Founded in 1918, its mission is to be the definitive voice for all universities in the UK, providing high quality leadership and support to its members to promote a successful and diverse higher education sector. With 134 members and offices in London, Cardiff and Edinburgh, it promotes the strength and success of UK universities nationally and internationally.

www.universitiesuk.ac.uk
BRITISH UNIVERSITIES & COLLEGES SPORT
British Universities & Colleges Sport (BUCS) is the national governing body for higher education sport in the UK, which aims to enhance the student sporting experience in performance, competition and participation. Delivering 50 sports, including disability sports, the BUCS programme is available to 2.3 million students across the UK with over 100,000 students regularly competing in the programme. By providing access to and encouraging participation in sport, BUCS is committed to getting students more physically active. 36% of the student population is physically active in comparison to 21% of the general population (Sport England, Active People).

www.bucs.org.uk

RESEARCH COUNCILS UK (RCUK)
RCUK is the strategic partnership of the UK’s seven Research Councils who annually invest around £3 billion in research. We support excellent research, as judged by peer review, that has an impact on the growth, prosperity and wellbeing of the UK. To maintain the UK’s global research position we offer a diverse range of funding opportunities, foster international collaborations and provide access to the best facilities and infrastructure around the world. We also support the training and career development of researchers and work with them to inspire young people and engage the wider public with research. To maximise the impact of research on economic growth and societal wellbeing we work in partnership with other research funders including the Technology Strategy Board, the UK Higher Education funding bodies, business, government, and charitable organisations.

The seven UK Research Councils are:
· Arts & Humanities Research Council (AHRC)
· Biotechnology & Biological Sciences Research Council (BBSRC)
· Economic & Social Research Council (ESRC)
· Engineering & Physical Sciences Research Council (EPSRC)
· Medical Research Council (MRC)
· Natural Environment Research Council (NERC)
· Science & Technology Facilities Council (STFC)

www.rcuk.ac.uk
INTRODUCTION

This summer the best athletes in the world come to London to showcase their skill, represent their country and try to win a medal at the London 2012 Olympic and Paralympic Games. The significance of hosting an event on this scale cannot be underestimated and will impact on the lives of all of us, whether you live in London or elsewhere in the UK. The whole country will get behind Team GB to encourage and support them in their endeavours to achieve the best performance and make Britain proud.

As part of an Olympic and Paralympic themed Universities Week this new report highlights just some of the many ways in which research will help Team GB achieve exceptional results. While most attention will be on the results achieved in London this summer, it is inspiring to look at the research taking place in UK universities that will help make London 2012 the best Olympic and Paralympic Games in history. Importantly, the impact of this research will be felt by many more people once the Games are over.

It is sometimes easy to forget when you watch an athlete or team compete just how much preparation has gone into their performance. This isn’t simply a training schedule or practice, sport today makes use of ground breaking research to aid everything from nutrition, health, equipment, physiotherapy, rehabilitation and performance. The first chapter of this report features examples of cutting-edge technology and manufacturing. Increasingly, this knowledge is being applied to sport and is already helping our athletes improve their competitiveness. As well as developing advanced prosthetic limbs, researchers are using biomechanical analysis to help athletes perfect rowing techniques and diving movements. One researcher has had great success using mathematical modelling to help sprinters who run round bends and has worked with numerous Team GB sprint and relay stars.

“This new report highlights just some of the many ways in which research will help Team GB achieve exceptional results.”
Research is increasingly being used to help athletes maintain their health and wellbeing so that they can perform to the best of their ability. Some researchers have even found that cherry-based supplements are highly beneficial to marathon runners! Research is also ongoing into how to best test for illegal substances and educate people about the dangers associated with doping. At the Games this summer researchers and students will be working with international pharmaceutical companies to run a Drug Control Centre to manage the task of testing samples from thousands of athletes.

The design of equipment such as kayaks and bobsleighs has proved to be as important as the skill of the athlete using them. Design works together with technology to give athletes that extra split-second or millimetre advantage which can mean the difference between gold and silver. As well as equipment, researchers are also using design to produce unique footwear and clothing and of course, design was a key factor in developing the Olympic Park itself.

Sports development within our universities is encouraging greater participation in sport by students, school pupils and the wider local community. The sports facilities at universities are available for the public to use as well as the students and athletes who train there. Universities are working with BUCS and various National Sporting Bodies to help inspire more people to get involved in sport, encourage an active lifestyle and hopefully produce the next generation of Olympic and Paralympic medal winners.

The final chapter of this report looks back at the history of the Olympic and Paralympic Games and the way this has shaped the modern version that will come to London. This year will be the third time London has hosted the Games and the city is an integral part of its history. When we bid to host the 2012 Games, a key element was the legacy that would be created. The regeneration taking place in East London is remarkable, but the social regeneration will be felt much further afield than just in London and will reach across the whole of the UK. Researchers are already looking into the potential legacy of the London 2012 Games and early indications show that a positive impact on the economic growth of the UK is already being felt. This report is a unique snapshot of how important research is, not only to our success at this summer’s Games, but to the long-term prosperity and wellbeing of the UK.
Supporting a UK Success Story: The Impact of University Research and Sport Development
Today athletes employ numerous technologies to help them train and achieve the best results. As the quest to go faster, further and longer continues, researchers are developing new and more complex technologies as well as applying traditional engineering techniques to sport. Some use of technologies can be controversial, but more often than not they are helping athletes break new records of physical endurance, skill and speed. For example, advances in prosthetic technology have caused some controversy, with questions being asked about whether or not it can give an unfair advantage. Researchers at Bournemouth University are investigating the use and perceptions of prosthetics used in competitive sprinting at events such as the Paralympics. The project aims to develop a better understanding of how this type of technology performs and how its impact can be measured. If achieved successfully, this research could help develop a better idea of what is a ‘fair’ use of prosthetic technology within disability sprinting.

The University of Southampton’s Performance Sports Engineering Laboratory (PSEL) is a team of academics and research engineers engaged in developing sports equipment and technology and helping top sportsmen and women achieve sporting excellence. PSEL engineers have had a close working relationship with UK Sport since early 2005 and collectively worked to support the performance of the athletes who won 16 of the 20 gold medals won by Great Britain in the Beijing and Vancouver Olympics. The partnership with UK Sport has focused on sports involving high speed where there are potential gains in the aerodynamic and hydrodynamic characteristics of the athletes and their equipment. Initially, much of this work concentrated on cycling, where results have been dramatic. From coming third in the medals table at the Athens Olympic cycling events in 2004, Great Britain progressed over the next five years to come top of the medals tally for three out of six Union Cycliste Internationale (UCI) Track Cycling World Championships, and in 2008 to lead the Beijing Olympic cycling medals table by an impressive margin, notably with Sir Chris Hoy’s three gold medals. Other Olympic sports to have benefited from PSEL expertise include kayaking, rowing and sailing. Winter sports have also been successfully supported by the PSEL, in particular snowboarding and skeleton bob. The development of the skeleton bob used so successfully by Amy Williams to win gold in the 2010 Winter Olympics in Vancouver, is an example of a project run principally by Engineering and Physical Sciences Research Council (EPSRC)-funded Doctoral students at the University.
Engineering new products to aid training is something that has occupied Professor Alison McConnell at Brunel University for nearly 20 years. In 1994 she launched the first breathing training product for sports people. The POWERbreathe® is a simple mechanical device that can be likened to a “dumbbell for your diaphragm”. As little as 10 years ago, breathing training was not considered to be an essential part of athlete preparation. However, recent advances in our understanding of respiratory limitations to exercise performance have completely changed this view. The research conducted by Professor McConnell and her team at Brunel began by describing the physiological and performance effects of Inspiratory Muscle Training (IMT) to athletes and patients. The team then went on to understand the underlying mechanisms for these effects and then, using these insights, the team developed new training products and protocols. POWERbreathe® has become an important part of the preparation of elite competitors and has been used by Olympic and World Champions, including England’s 2003 Rugby World Cup winners (as well as their Australian rivals in the final). Outside of sport POWERbreathe® is also becoming more widely known and used within the NHS and overseas health providers to treat patients with breathlessness. Underpinned by Professor McConnell’s research, POWERbreathe® has created a new market in the sports sector for breathing training.

Bryce Dyer, Senior Lecturer in Product Design at Bournemouth University has helped create the prosthetic limb Irish Paralympic cyclist Colin Lynch will use at the London 2012 Games. The device aims to give Lynch a competitive edge, but like any sport, there are rules and regulations that the design has to adhere to, so it was created with those in mind. Lynch won gold when he trialled the bespoke prosthetic leg at the 2012 Union Cycliste Internationale (UCI) Para-Cycling Track World Championships in Los Angeles in February, the first competitive test for the para-cyclist this year. Bryce said: “The limb is shaped differently. It uses a different method of manufacture, and it’s very, very aerodynamic compared to conventional prosthesis. It’s designed to give him maximum speed and power transfer and is intended to give him something that would ultimately help and not hinder him in races.”

“POWERbreathe® has become an important part of the preparation of elite competitors and has been used by Olympic and World Champions, including England’s 2003 Rugby World Cup winners.”
Section one: Rehabilitation

New engineering technology is also being used to help rehabilitation following sporting injuries. Professor Jim Richards and his research group at the University of Central Lancashire have worked directly with industry to develop and test new equipment designed to reduce joint pain and to improve rehabilitation. One piece of equipment is the “Rehab Angel” which has been developed to treat tendon overuse syndromes. Squat exercises are a popular multiple joint workout and form an important part of most rehabilitation programmes. One rehabilitation technique is the single limb decline squat, which is usually performed at a 25 degree decline. The idea behind this is to reduce the work done by the ankle muscles and to increase the work done by the knee muscles, in particular the quadriceps. However the reason for the use of a 25 degree decline angle is not well established. Work by Professor Richards’ team has determined that the joint loads and the muscle work done at the ankle may be controlled by altering the orientation of the foot on the squat platform and by changing the angle of declination. “Rehab Angel” varies the decline angle and has the potential to be used in a progressive training regime that increases the loads through the knee whilst minimising the loads at the ankle. Using this range of decline squat angles allows clinicians to offer a controlled and graduated rehabilitation to the benefit of the patient.
Section One: Technology

STRENGTHENING FOUNDATIONS THROUGH 3D GEOLOGY

Around half of all cost and time over-runs on civil engineering projects are caused by ‘unforeseen ground conditions’, partly because we don’t understand enough about the ground’s physical, mechanical and chemical properties, and the processes acting on it. The 500-acre Olympic Park was no exception; all the major development projects there involved ground that engineers class as ‘difficult’. The land has been affected by high groundwater levels, compressible soils – which threaten foundations and underground constructions – and contamination from pollutants like oil, petrol, tar, arsenic and lead, which pose serious risks to water supplies and ultimately human health, if left untreated.

Traditionally, geological information has been displayed in two dimensions – as maps supported by cross-sections. The Natural Environment Research Council’s British Geological Survey (BGS) has significantly increased the value of geological information to the construction industry, by combining geographic information with 3D modelling software to produce high-resolution geological models of the shallow sub-surface. This 3D mapping helps engineers understand potentially difficult ground conditions by predicting the properties of rocks and other sub-surface features they may encounter. Using 3D models makes it easier to find drift-filled hollows, depressions in the bedrock filled with unconsolidated materials like sands and gravel which can cause major problems, such as uneven settling of a building’s foundations. BGS also developed a prototype screening tool for the Olympic Park, which will enable planners to efficiently evaluate possible sources of pollution and the pathways – like flooding – by which it could find its way into groundwater and become a risk to human health and the environment.

Using the models, BGS created ‘intelligent’ map layers and systems that support planning by clarifying the consequences of different choices. This means difficult conditions can be anticipated and mitigated, potentially significantly reducing the time and costs of construction projects.

“3D mapping helps engineers understand potentially difficult ground conditions by predicting the properties of rocks and other sub-surface features.”
Professors Alison McGregor and Anthony Bull at Imperial College London are helping the GB rowing team prepare for the London 2012 Games. Around four times each year, the athletes, their coaches and physiotherapists visit Professor McGregor’s lab where they undergo a series of tests to analyse their back and pelvis area, which are very important areas of the body used in rowing. The researchers use electro-magnetic sensors, which measure how the body moves, and load cell sensors, which measure the forces exerted by the athlete while they are rowing. The information gathered by the sensors is fed via wires into a computer, which displays information on screen in real-time. The information gathered by the sensors enables the research team, coaches and physiotherapists to make improvements to the athlete’s rowing technique during the session. The Imperial researchers first began to collaborate with the GB team in 2000, just before the Sydney Olympics. The team needed experts who could help them to understand the mechanics of the body in detail as they wanted to reduce the number of injuries incurred while training and competing. The Imperial researchers were the first to use sensors on UK Olympic rowing athletes to help them improve performance, which in turn reduced the incidence of injury. Later that year, the team went on to win gold at the Games.

“The researchers use electro-magnetic sensors, which measure how the body moves, and load cell sensors, which measure the forces exerted by the athlete while they are rowing.”
Since then, the Imperial team have carried out various studies with Team GB, with research varying from ways to predict lower back pain in athletes by analysing their rowing technique, to disorders of the jaw caused by athletes gritting their teeth excessively when training and competing. In the future, the team plan to develop their sensor technology further so that it can monitor athletes while they are training outdoors on rivers and lakes. At the moment, the technology can monitor the forces exerted by the athlete on the boat. The next step will see researchers developing wireless sensors to be worn by athletes to monitor their movements on the water.

Another example of research analysing athletes’ movements is being undertaken by Nicola Relph, a lecturer at the University of Cumbria, who is using biomechanical analysis to help UK 10 metre platform divers on two of the most difficult dives, the four-and-a-half somersaults for men and the inward three and a half somersaults for women. The analysis is helping to aid training by giving coaches and divers a good idea of the important mechanical variables on themselves and their competitors.
Applying science to sport is not necessarily a new phenomenon. Sports science is now employed by coaches and elite athletes to analyse technique, minimise physical impact and squeeze as much out of the physical body or equipment as possible. One researcher at the University of Bath is aiming to understand the fundamental principles underlying performance in order to improve an individual athlete’s technique and efficiency. Specifically Dr Aki Salo and his team are looking at the mathematical modelling of the sprint start and investigating sprinting on bends, for example the 200 metres. For over 10 years Dr Salo has also worked with British 4x100 metre relay teams investigating the baton exchanges and advising the teams to improve the efficiency of these changes. Mathematical modelling of the sprint start allowed the research team to learn key aspects of the start and how an athlete’s technique could be manipulated to improve their performance. Traditionally, this has been done using trial and error by coaches during training, but this model can investigate mathematically which technical changes could help to improve performance. This can greatly aid training and ensure time and, more importantly, vital energy is not wasted through repeated practice. The same principles can be applied to bend sprinting which requires leaning inwards rather than running in a straight line. The techniques needed in bend sprinting seem to be different to those that coaches and athletes would instinctively think to employ. The analysis of relay teams concentrates on the baton exchanges and how the team could maximise its performance. The significance of Dr Salo’s work has meant that UK Athletics have invited him to attend pre-competition training camps over the last 10 years. Notably, Dr Salo was the only biomechanical technical personnel in the whole of Team GB for the Beijing Olympics in 2008. During these preparation camps and at the Championships themselves, Dr Salo has worked with the best British athletes and their coaches – advising and supporting their preparations. Several of these athletes have won medals, for example, the men’s 4x100 metre relay team Gold medal at the Athens Olympics 2004.

Researchers at the University of Southampton are also using science to help aid performance by applying naval architecture techniques to understand the science of human swimming. This work has applied techniques developed for evaluating ship self-propulsion, as well as novel wireless sensor and synchronised video systems to capture the dynamic behaviour of the underwater phase of competitive swimming. PhD students from the University’s Performance Sports Engineering Laboratory (PSEL) have been working on developing a new system for analysing swimming performance that is being used by many of the top British swimmers in conjunction with British Swimming world class technical adviser, Jonty Skinner. When designing a ship, naval architects examine the relationship between a ship’s hull, its shape and how best to propel it through water with minimum power. The Southampton team are using a similar approach and have developed a rig suitable for towing a swimmer through the water whilst tracking propulsive force and speed. As they move along in the water, the swimmer is also recorded by two cameras, above the lane and beside it. After swimming a length they can get instant feedback on their speed, power and drag, their ultimate body position and where, on each stroke, they were strong or weak as well as watching the footage of their technique. This on-going research programme is jointly funded by British Swimming, UK Sport and the University of Southampton.
Men’s 4×100 m relay team review their practice runs at the Aviva World Championships Preparation Camp in San Antonio in summer 2009. From L-R: Craig Pickering, Simon Williamson, Marlon Devonish, Dr Aki Salo, Harry Aikines-Aryeetey, Rikki Ffilton, relay coach Michael Khmel and Tyrone Edgar. Photo courtesy of Aviva/Getty Images
Football is one of the most watched and lucrative sports in the world. The World Cup every four years, like the Olympic and Paralympic Games is watched by millions of people around the world, so the pressure to perform is very high. Technology is increasingly being used in football to help aid both training and play. Some technologies such as goal line video playbacks to help referees determine if a goal has been scored provoke much debate, but there is no doubt that football, like other sports can benefit from advances in technology.

GOAL LINE TECHNOLOGY

A disputed goal in football is one where the ball crosses the goal line and is returned illegally into play without the match officials being aware of this. The most famous incident of this kind occurred in the World Cup Final in 1966 (Geoff Hurst’s goal) and there was a repeat during the England/Germany World Cup game in 2010 (although the goal was not allowed) when Frank Lampard’s shot was seen to bounce back from nearly one metre behind the goal line following the ball’s impact with the cross bar. To counter this, new research, led by Dr Ken Bray with support from Professor Emeritus A N Bramley, from the University of Bath, used an experimental rig simulating a crossbar and a ball launcher to propel the ball against it at a range of speeds and angles. High-speed digital video of these events was analysed so that impact angles and, importantly, acquired spin could be measured precisely. A ball striking a crossbar at speed acquires substantial spin and it is this spin following impact with the ground which is capable of reversing the ball’s direction. By constructing mathematical models of the ball’s impact with the crossbar and subsequently with the ground, the ball’s movement could be determined with precision and the range of parameters where the ball would be returned into play determined. Much attention has been paid to the problem of disputed goals in football and the approach, defined generically as “goal line technology”, has emphasised either ball instrumentation or digital imaging as a potential solution. This new research may lead to the development of mitigation measures where cross bar impacts could be rendered “spin free”. This would eliminate velocity reversal following the ball’s impact with the ground and the removal of this source of disputed goals.

TRAINING FOR REFEREES

It’s not only players who need to keep fit, the role of the football referee is vital and they have to maintain a high level of fitness as well as remain alert and calm. Premier League football referee Howard Webb has praised the ‘pivotal’ role played by sport science staff at Sheffield Hallam University in his preparation for officiating the 2010 World Cup Final between Holland and Spain. He had lots of support from Sheffield Hallam University in the run-up to the tournament, including intensive conditioning work in the state-of-the-art environment chamber, which gave him an added edge, both mentally and physically. His training at Sheffield Hallam used technology that simulated high-altitude conditions to ensure he could perform mentally and physically at altitudes of up to 6,000 feet. Howard completed 12 intensive sessions with Sheffield Hallam’s podium performance team and underwent sport psychology sessions with Professor Ian Maynard, who works with referees and elite athletes, and is Director of the University’s Centre for Sports and Exercise Science. The world-class referee said: “Sheffield Hallam’s facilities and expertise gave me a great platform to prepare for South Africa. Taking part in the biggest match in world football was the absolute highlight of my career and Sheffield Hallam has played an important role in helping me and my team get there. The World Cup is a showcase for every referee and I think the expertise I accessed was crucial to my progress in the tournament.”
REPLAYS IN 3D SKELETAL MOTION

Researchers at the University of Surrey are working in collaboration with the BBC to investigate technology that uses video coverage of athletic performance from a single broadcast video camera. Due to the constraints of TV production at events such as the Olympic and Paralympic Games it is not possible to install specialist multiple camera systems which allow direct recovery of 3D information. The aim of this research is therefore to reconstruct the 3D skeletal motion of an athlete from a single moving broadcast camera. This research project is developing a semi-automatic approach to allow recovery of the 3D motions. Initially the 2D skeletal point locations of an athlete are identified by an operator from the video sequence. The 3D skeletal pose is then automatically recovered using the visual geometry to estimate the athlete’s pose at each of the key
“This interactive approach will allow a broadcast operator to reconstruct the 3D skeletal motion of an athlete allowing subsequent use for analysis and commentary.”

frames. This interactive approach will allow a broadcast operator to reconstruct the 3D skeletal motion of an athlete allowing subsequent use for analysis and commentary. For example, the recovered skeletal motion might be used to compare different high-jump attempts for an individual athlete or to allow comparison between athletes in a track event such as the 100 metres.

The Centre for Vision, Speech and Signal Processing (CVSSP) at the University of Surrey has had a close collaboration with BBC Research and Development for over a decade working on a number of joint industry-academic research projects supported by the UK Technology Strategy Board and the EU. These projects have focused on the use of computer vision in broadcast production and specifically on the analysis of video captured from multiple views to capture 3D reconstructions of actor performance or live events. In addition to collaborative projects BBC Research also directly sponsor a number of PhD students in CVSSP. This allows investigation of long-term research problems which are of direct interest and relevance to the BBC. This currently includes PhDs in 3D video production, sports-player motion analysis and advanced tools for video editing.

**KEEPING YOUR COOL**

The Extreme Environments Laboratory in the Department of Sport and Exercise Science at the University of Portsmouth has a well-established international reputation in the area of thermal physiology—the effect of temperature on the human body. Researchers examine the physiological and psychological responses to adverse environments and work with a range of elite sporting groups as well as the military, oil industry, fire-fighters, RNLI and HM Coastguard. The laboratories at Portsmouth are also the recognised thermal physiology labs for UK Sport.

Professor of Human and Applied Physiology, Mike Tipton, explains: "It’s a well-established fact that performance degrades as you become too hot and there are so many sports where heat can affect anything from concentration to physical performance. Shooting or fencing, for example, both require quick decision-making, and heat can have a profound effect on this.” The group’s research was particularly effective at the 2004 Olympics in Athens and 2008 in Beijing. In 2004 Great Britain’s cyclists used cooling chairs where the athletes sat with their hands immersed in plastic bags full of ice attached to picnic chair armrests.”

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USING GPS TECHNOLOGY TO REVEAL SECRETS OF PERFORMANCE

Researchers from the University of Chester are using Global Positioning System (GPS) technology to investigate the demands on players in elite rugby. The first results from the three-year study show significant differences between six positional groups of players (front row, second row, back row, scrum half, inside backs and outside backs) in terms of time on pitch, total distance covered, distance covered at low speed run and high speed run, maximum speed and average speed. Lead researcher Dr Paul Worsfold explains: “In the past five years, GPS technology has had a significant impact on performance analysis in elite sport. We can now accurately evaluate the training loads and activity profiles of players in competitive situations on the field. The aims of the study are to focus on the use of GPS in training and game performance to establish positional demands, to identify potential injury risk, and to monitor relationships between training, competition and fatigue.”

By the end of the competitive rugby season, the researchers will have collected over 450 sets of GPS match data from players. The results of the study will enable individual players to gain information on the physical demands of their specific positions during a match situation, and allow them to compare their own performances with the averages across Premiership Rugby. The researchers hope that their findings will help coaches, sport scientists and players devise specific training and monitoring programs for each position to optimise performance and player safety.
HEALTH AND WELLBEING: DRUGS AND DOPING

Doping has plagued sport to varying degrees throughout the course of history. It is something that generates passionate feelings and fierce debate in athletes as well as the public. The rules on doping are strict and non-negotiable. Once an athlete has tested positive for banned substances they can face a lengthy ban from their sport as well as damage to their reputation.

TESTING ATHLETES FOR BANNED SUBSTANCES

In spite of the rules and negative public attitude towards doping, some athletes continue to use performance-enhancing drugs in their quest to win medals and break records. For the London 2012 Olympic and Paralympic Games, King’s College London is working in partnership with GlaxoSmithKline (GSK) to provide world-class anti-doping laboratory services. Researchers at King’s College London have developed super-fast and super-sensitive technologies to detect prohibited substances. The ultimate goal is to deter athletes from cheating and help protect their health.

A team of more than 150 anti-doping scientists, led by Professor David Cowan from the university’s Drug Control Centre will carry out testing during the London 2012 Games. Around 80 university students will work as assistant analysts alongside the scientists. Several students from the Health and Human Sciences Research Institute at the University of Hertfordshire have also been recruited to work as assistant analysts during the Games.

The Drug Control Centre at King’s College London, led by Professor Cowan is the only World Anti-Doping Agency (WADA) accredited laboratory in the UK. It is a world-leading centre with a track record in anti-doping control, analysing samples collected from athletes competing in major sporting events and training worldwide. Professor Cowan will lead a hi-tech WADA-accredited satellite laboratory provided by GSK in Harlow to analyse over 6,250 samples during the London 2012 Games, more than ever before. It is hoped that the new super-fast, super-sensitive techniques will act as a deterrent to any athlete thinking about using performance enhancing drugs.
A number of new technologies will be used to test for banned substances. For the first time in an Olympic Games, full-scan high-resolution mass spectrometry will be used to provide the most comprehensive data on the composition of the athletes’ urine samples. These data sets will then be examined to determine whether any banned substance is present. Identifying the presence of pseudo-endogenous substances represents a particular challenge. For example, growth hormone is a natural hormone and therefore could be expected to be found in an athlete’s blood. Also, the level of growth hormone will change dramatically throughout the day. These challenges have made the development of a test for growth hormone a priority for WADA and UK Anti-Doping. Although there is a test currently in use, it can only be used within a short time frame. Researchers based at the University of Southampton, King’s College London and the University of Kent at Canterbury are developing a biomarker test that can be used over a longer period of time. These biomarker proteins rise when growth hormone is administered and remain high for several weeks which can give drugs testers a longer window of opportunity to detect banned substances. Any test used in anti-doping must be robust and withstand legal and scientific challenge. The research team has been working to address these issues to ensure that the test is water-tight at the point of its introduction.

DRUGS AND DOPING – AN EDUCATION

Researchers at Liverpool John Moores University have looked at how effective anti-doping systems have been in the past and what could be done to improve them. The research highlighted the need for international collaboration between the International Olympic Committee (IOC), governments and sports federations, which resulted in the creation of the WADA. The researchers also looked at the use of over-the-counter drugs, such as medicine for colds and other illnesses, and whether they actually affect an athlete’s performance. Often these drugs are taken by athletes without them being aware that they are actually banned substances, so the researchers have gone on to look at education around drug use in sport. It is hoped that by educating people more about the dangers and illegality of doping, fewer athletes will be tempted to use drugs.

The researchers at Liverpool John Moores along with colleagues at the universities of Manchester and Greenwich have developed a new education programme for pharmacy volunteers at the London 2012 Games having recognised that nothing similar was currently offered in the UK. This programme has also been available to all healthcare professionals in the UK to help them deal with both elite athletes and members of the public who participate in sport and exercise and may or may not use performance enhancing drugs.

Research at Leeds Metropolitan University has found that drugs testing alone is not enough of a deterrent to stop athletes from taking performance-enhancing drugs. The researchers from the university’s Carnegie Research Institute investigated athlete’s beliefs and willingness to use performance-enhancing drugs and found that more emphasis needs to be placed on doping prevention and education to change perceptions of doping. The research also found that an athlete is highly influenced by their coach and so coaches must be made a priority group for anti-doping education. Work in this area is ongoing to understand what makes an athlete decide to use drugs and this research will inform future anti-doping education.
It might sound a little far-fetched, but researchers at the University of Northumbria, in partnership with a PhD student at St Mary’s University College, have found that cherries can help improve the performance of marathon runners. The researchers asked 20 marathon runners to drink either a cherry blend juice or a placebo drink twice a day for five days before taking part in the London Marathon and for two days afterwards. The findings indicated that the group who drank the cherry juice recovered their strength more rapidly than the other group over the 48-hour period following the marathon. The researchers concluded that cherry juice appears to aid recovery following strenuous exercise by increasing total antioxidative capacity, reducing inflammation and oxidative stress and therefore helping the body recover muscle function.

Another researcher from Sheffield Hallam University has found that caffeine combined with carbohydrate could be used to help athletes perform better on the field. Mayur Ranchordas, a senior lecturer and performance nutritionist conducted studies on footballers using caffeine and carbohydrates combined in a drink. Along with improvements in endurance caused by ingesting carbohydrate, the athletes’ skill level improved after taking caffeine and carbohydrate together. He said: “There is already plenty of research that shows that caffeine and carbohydrate improve endurance, but this study shows that there is also a positive effect on skill and performance. We found that the combination of carbohydrate and caffeine allowed players to sustain higher work intensity for the sprints, as well as improving shooting accuracy and dribbling during simulated soccer activity. These findings suggest that, for athletes competing in team sports where endurance and skill are important factors, ingesting a carbohydrate and caffeine drink, as opposed to just a carbohydrate drink, may significantly enhance performance.”

New research that took place at the University of Central Lancashire looked at the use of calcium supplements by elite athletes and whether this has an impact on performance. Calcium is the most abundant mineral in the human body and is needed for healthy bones and also some critical biological functions including nerve impulses, muscle contraction, cell adhesiveness, mitosis, and blood-clotting. Although still in its early stages, this research has found that calcium can have an effect on metabolism, fatigue and vascular tone and therefore increase the efficiency of an athlete’s body. The use of calcium as a performance enhancing supplement still requires more research, but early findings indicate that it can play a role in performance enhancement for endurance events.

TRAINING TECHNIQUES

Most people know, whether they are elite athletes or not, that it is important to warm up properly before exercising or taking part in sport to help prevent muscle cramps or other injuries. A group of researchers from Aberystwyth University, the University of Brighton and the University of Exeter have been looking at new ways of warming up that can actually help improve an athlete’s performance. The team have studied warm up techniques that involve doing high-intensity exercise, known as “priming”, before the main exercise session or race. Priming increases
the concentration of lactate in the blood and since the production of lactate makes the blood acidic, priming exercise can be thought of as an ‘acid-up’ (as opposed to a ‘warm-up’). It is generally thought that a high concentration of lactate acid makes athletic performance worse, but the researchers have repeatedly shown that the effects of priming can actually make performance better. Specifically, it seems to enhance the body’s ability to use oxygen when the main bout of exercise is performed and this, in turn, improves performance.

Priming is, of course, a legal means of enhancing performance. It will improve performance in any event that lasts from around two minutes up to about 30 minutes. In an athletics stadium, this means all events from the 800 metres to the 10,000 metres could be improved by priming exercise. Many cycling and rowing events will also be improved by priming exercise. Consequently, many of the great performances in London 2012 could be achieved by an athlete ‘primed’ by an ‘acid-up’ developed by scientists in UK universities.

KEEPS HYDRATED

Athletes dehydrate, or lose body fluid, during competitive events, even when it’s not particularly hot. Dehydration can impair both physical and mental performance and even low levels of dehydration can lead to severe physiological consequences. A loss of two per cent bodyweight can cause an increase in perceived effort and is claimed to reduce performance by 10 to 20 per cent. Many motorsport events, such as those that take place in the United Arab Emirates, are held in extreme high temperatures where the concerns of dehydration and physiological function are normally associated with the sports person, while the effects of dehydration on support staff such as race marshals is often ignored.

Dr Gareth Davison of the Sport and Exercise Sciences Research Institute at the University of Ulster in collaboration with Dr Sean Petherbridge, Chief Medical Officer of the Automobile & Touring Club of the United Arab Emirates, have received funding from the Federation Internationale de l’Automobile (FIA) Institute to examine the effects of dehydration on physiologically related vital signs in motorsport marshals working in a hot and humid environment within the United Arab Emirates. A secondary aim of this work will be to provide important information that will contribute towards the production of a best practice report for motorsport marshals in extremely high temperatures. This research is due to begin shortly and will be of particular interest to athletes hoping to take part in the 2016 Olympics which will be held in Rio, Brazil and the FIFA World Cup in Qatar.
FIGHTING FATIGUE

Researchers at the University of Bath led by Dr James Betts are currently running the latest in a series of studies to understand better the mechanisms of fatigue during exercise. They are particularly keen to look at instances where repeated bouts of demanding exercise are required without an adequate break for full physical recovery. This has relevance to intensive periods of competition, such as the Olympic Games, but also the ongoing daily training of both athletes and recreational exercisers alike. The team are examining the differences in fatigue experienced between an initial bout of exercise and subsequent repeated bouts, while simultaneously evaluating the impact of various nutritional strategies on this relationship. The work combines a broad range of contemporary measurement techniques, from analysis of fuel levels within human muscle samples, to measuring the concentration of key hormones in blood, to monitoring changes in central nervous system activation. The findings will contribute to our fundamental understanding of human physiology, but with clear application to the development of evidence-based nutrition and training programmes for athletes in the lead-up to the Olympic and Paralympic Games. Another group of researchers at the University of Brighton are unraveling the mystery of how the brain determines how much exercise we are capable of.

“The work combines a broad range of contemporary measurement techniques from analysis of fuel levels within human muscle samples, to measuring the concentration of key hormones in blood, to monitoring changes in central nervous system activation.”

Although the limits to human performance have been explored for decades, only within the last 15 years has the study of the brain’s involvement in exercise tolerance been debated by sport and exercise scientists. Originally, researchers assumed that fatigue was caused because muscles couldn’t operate effectively as a consequence of prolonged or intense physical exertion. However, the introduction of techniques such as “transcranial magnetic stimulation”, a non-invasive method that assesses the brain’s control of muscles, has allowed researchers to explore just how influential the brain is in muscle fatigue. The researchers hope that this research could lead to new training methods and ultimately improve the performance of athletes.
Dr James Betts sampling blood for analysis in the foreground while Mark Tweddle provides an expired gas sample whilst wearing an EEG monitor to check his brain activity.
A common cold can cause discomfort and disrupt the lives of many of us when we are unfortunate enough to catch one, but the effects on an elite athlete could mean they are unable to train or compete and this could have serious consequences for their career. The finely tuned bodies that athletes use to compete with are just as susceptible to injury and illness, but the impact is perhaps more significant than that felt by the average person. Researchers are looking at ways in which the likelihood of injury and illness in athletes is limited, so they can compete to the best of their ability.

Research being led by the University of Nottingham is looking at illness and injury in elite sport with the aim of guiding the design of interventions that can be used to reduce the impact of illness and injury on performance. Injury prevention is a key area for the International Olympic Committee (IOC) along with other international sports governing bodies. UK Sport and the English Institute of Sport see the prevention of athlete injury and illness as a way in which athletes can improve their chances of success, particularly in high performance sport where the winning margins are small. In the past only a small number of sports used injury information to help shape their illness and injury prevention strategies. Since the start of this research project 43 per cent of Olympic sports have reported using injury data to help keep their squads in good health and free from injury. An average of 11 days of training and 0.4 competitive events are lost per injury and around five days of training and 0.3 of competition events are lost per illness, so being able to prevent athletes picking up injuries and illnesses is an important part of fielding the best team.

The University of Birmingham has developed a new mobile clinical research facility called the Health Research Bus (HRB) which is setting out to transform the way that clinical research for major health issues like diabetes, obesity and ageing is carried out in the community. The bus has state-of-the-art scanning equipment and consultation rooms, which will enable scientists from the university to carry out a wide variety of clinical studies, scanning programmes and health promotion activities anywhere in the region. It is about to be used by athletes competing in the London 2012 Games to monitor their bodies during training. One particular piece of technology it has on board is a dedicated DXA (Dual-energy X-ray Absorptiometry) scanner, which is used for measuring body composition and bone density. The HRB is being run through the Wellcome Clinical Research Facility and is a partnership with University Hospitals Birmingham Foundation Trust and Birmingham Children’s Hospital NHS Trust. The HRB was supported as part of the translational medicine strand of the Science City Research Alliance between the University of Birmingham and the University of Warwick.

“Since the start of this research project 43 per cent of Olympic sports have reported using injury data to help keep their squads in good health and free from injury.”
A HEALTHY LEGACY

Recognising the importance of ensuring a legacy following the London 2012 Olympic and Paralympic Games a unique £10 million centre for sport and exercise medicine is being set up in the East Midlands as part of Olympic-year government plans to promote health and fitness. The Centre will be one of three hubs that form the UK’s first National Sports and Exercise Medicine Centre of Excellence. The aim of the Centre is to conduct research into ‘exercise as medicine’, increase public awareness of this and improve the health of patients with chronic diseases.

The Centre will also help encourage people to be more active and will provide treatment for injuries caused by exercise and conditions associated with lack of exercise. This will help people who are injured return to physical health and work quickly. The Centre also hopes to encourage people to use physical exercise to cope with existing medical conditions, such as diabetes. The Centre will be run by a network of partners including Loughborough University, the University of Nottingham, the University of Leicester, Nottingham University NHS Trust, University Hospitals of Leicester NHS Trust and Nottinghamshire Healthcare NHS Trust.

The Olympic Regeneration in East London (ORIEL) is a five year National Institute for Health Research-funded quasi-experimental study, investigating the social and health legacy of the Games. At the start of the study, questionnaires will be given to approximately 3,000 school children, as well as their parents, in Newham (the main Olympic borough) and comparison boroughs of Tower Hamlets, Hackney and Barking and Dagenham. Data will be collected on a range of topics, but will primarily assess participants’ health and wellbeing, neighbourhood change, social and economic status and participant’s thoughts and feelings about the Games and its legacy. Children and parents will be revisited two further times in 2013 and 2014 to assess how their lives have changed over time as a result of the Games. In addition 20 families will be the focus of an in-depth ethnographic study in Newham, where researchers will spend time with these families capturing the experience of London 2012 – the build up to it, during the event and after it has finished.

The findings will give an insight into the real impact of the Games on the daily lives of people in East London with a focus on health, such as physical activity and psychological well-being; and the social and economic determinants of health, such as employment and income. Led by Professor Steven Cummins, the ORIEL team is made up of three postdoctoral researchers and ten investigators from Queen Mary, University of London, the London School of Hygiene and Tropical Medicine and the University of East London.
HEALTH AND WELLBEING: HEALTHY MIND

The pressure of competing at an Olympic or Paralympic level can take its toll on the mental as well as physical wellbeing of an athlete. When interviewed about their performance, sports stars often talk about their mental preparation as much as they do their physical training. A common thought is that a healthy mind helps maintain a healthy body and so it is important that athletes prepare both before a big event. Researchers from universities across the UK are working with athletes to help them maximise their performance by maintaining a healthy mind.

UNDERSTANDING HOW ATHLETES’ BRAINS WORK

While sporting success is dependent on talent and dedication, a researcher at Royal Holloway, University of London has discovered that success also lies in the ability of the brain to develop automatic thinking and movement. The research involved scanning participants’ brains using a Magnetic Resonance Imaging (MRI) scanner while they were asked to learn certain skills. This allowed the researchers to analyse the ways in which the brain learns mental and motor skills.

By the end of the study, these mental skills had become so automatic that the participants were able to perform them well, even while simultaneously performing a second task which was distracting. As each participant practiced a task, the cerebellum (a structure in the brain containing half of the brains’ neurons) showed activity changes suggesting it was storing up the learned information which could be used again. Understanding how the brains of elite athletes work could help athletes to achieve sporting excellence by thinking and acting fast and efficiently.

Research carried out at Northumbria University found that deceiving the brain can lead to an improvement of up to five per cent in sporting performance. In a research project, trained cyclists were asked to race against an avatar on a computer screen which they believed was moving at the rate of the cyclist’s personal best. However, the avatar was actually going at a speed one per cent faster than the cyclist’s fastest time.

Despite this, the cyclists, who could also see themselves as an avatar cycling the virtual course, were able to match their opponent, going faster than they ever had before. The researchers believe this is because there is a reserve of energy production that can be tapped into, even in well-trained athletes. In training, the
Among the risks that elite sports participation brings is a susceptibility to eating disorders, which occur more often in elite athletes than the general population. In sports like gymnastics, with its emphasis on slimness and low bodyweight, vulnerability to these conditions is greater. Researchers at Swansea University have worked in partnership with British Gymnastics to look at the welfare of elite gymnasts in relation to the presence of eating disorders in certain disciplines of the sport. The researchers specifically investigated gymnasts’ perceptions of their freedom to choose and balance the competing aspects of their lifestyle. The study combined social science methods with theory from the fields of psychiatry and philosophy to study eating disorders in elite gymnastics and make recommendations regarding policies to improve the welfare of elite gymnasts, who are pushing the boundaries of their athletic potential. The findings from the research will be made available to a range of audiences, to maximise the impact of the study on practices within elite sport. Ultimately, the research is intended to help the understanding and development of policies to promote the mental health of elite athletes, particularly with respect to eating disorders.

The mental wellbeing of athletes is as important, if not more so, when they retire from competition. The intensity of training and commitment athletes make to achieve success can have negative consequences. Professor David Lavallee, Head of the School of Sport at the University of Stirling, Scotland’s University for Sporting Excellence, studied the impact on Olympic and Paralympic athletes who make the move to other careers after they retire from sport. The research aimed to help young athletes plan for their future lives after sport and found that high-level sporting competition plays an important role in developing transferable skills such as communication and time-management, but athletes who focus exclusively on their sport can become role-restricted and be more at risk of finding it difficult to change career. The athletes who were better prepared for life after sport managed to balance their education and career development alongside training and competition. The research has been adopted by athlete lifestyle programmes around the world.

“The mental wellbeing of athletes is as important, if not more so, when they retire from competition. The intensity of training and commitment athletes make to achieve success can have negative consequences.”

Mental Wellbeing

mind anticipates the end of a bout of exercise in order to set an initial pace. Sensory receptors, which monitor the body’s responses, feed this information back to the brain, allowing it to control the body’s resources to last until the end of the exercise to avoid damage. By making the brain think in this way it allows the body to tap into this reserve energy supply and keep on performing.
MENTAL TRAINING

An occasion such as the Olympic Games puts considerable mental pressure on an athlete to perform well. While some will thrive under this pressure, some athletes struggle with and are susceptible to ‘choking’ at the moment of competition. Researchers at Bangor University’s Institute for the Psychology of Elite Performance (IPEP) have been examining how individual differences in personality might predict how well athletes perform under pressure.

In particular, the researchers have found that athletes with a narcissistic personality think of themselves as excellent performers and tend to perform very well under the pressure of competition. However, in contrast, non-narcissistic individuals may be more susceptible to choking under pressure and not performing to the best of their ability. By considering these individual differences in personalities, coaches and sport psychology practitioners can tailor their training to meet the specific needs of athletes. This can help increase the chances of successful performances at major events such as the Olympic and Paralympic Games.

A collaborative project between five UK universities is looking to advance understanding of emotion regulation and how this can have considerable costs or benefits to an individual’s wellbeing and performance. The Emotion Regulation of Others and Self (EROS) project involves researchers from a number of psychological disciplines including sports psychologists from the University of Wolverhampton.

This team have found that athletes can ‘learn’ which emotional state best aids their performance and can teach themselves to achieve it before competing. The researchers have also found that when athletes perform intense exercise, they begin to think negatively and experience unpleasant emotions which makes the exercise feel harder until it actually becomes more physically demanding. The researchers have examined the effectiveness of simulating light to help GB swimmers improve their mood ready for early morning training and are offering workshops on emotion regulation for sports psychologists and coaches who work with elite athletes.

Elite athletes at the Olympic or Paralympic Games will be under intense pressure to perform. Researchers at Bangor University’s Institute for the Psychology of Elite Performance (IPEP) have found that some athletes are likely to suffer from the ironic error - the performance error that each athlete will be specifically trying most to avoid. For example, if a golfer under pressure tells themselves, “whatever you do, do not hit the ball short”, they will ironically tend to hit the ball short more consistently than when not under pressure.

The research team’s most recent findings confirm this and show that athletes under pressure do not commit random errors, they commit specifically the error that they are trying to avoid (the ironic error). Also athletes who attempt to mask their anxiety, for example by trying to “look cool”, when under pressure are more likely to suffer from ironic performance effects. This is because their cognitive system is overloaded by repression-associated cues, for example “do not show anxiety”; “do not hit the ball short”.

The researchers have found two ways of reducing the likelihood of committing an ironic error. The first is to reduce anxiety and therefore the pressure that is experienced and the second is to use positive statements when preparing for the competition, for example “focus on the centre of the hole”. Adopting this kind of psychological behaviour could be effective for a great number of athletes competing at the Olympic and Paralympic Games and in other international sporting competitions.
Athletes are particularly vulnerable to the effects of air pollution as a consequence of their heavy training regimes and high breathing rates during competition, which increases their pollution dose. The effects of air pollution on athletic performance were evident at the Los Angeles Games in 1984, when the UK’s Steve Ovett collapsed following the 800 metres final with severe respiratory problems, citing air pollution as a major trigger in the exacerbation of his exercise-induced asthma. Monitoring air pollution levels in the lead-up and during the Games is crucial to assess and manage health risks to athletes who will be competing in London 2012.

Researchers from King’s College London were asked to give evidence to the International Olympic Committee about pollution data for London which might effect the 2012 Games. Pollutants such as nitrogen dioxide mainly effect wide areas of London during the winter, but each week in August there is a 10 to 20 per cent chance of ground level ozone exceeding World Health Organisation Guidelines.

“Each week in August there is a 10 to 20 per cent chance of ground level ozone exceeding World Health Organisation Guidelines.”

London has the largest and most advanced air quality surveillance systems of any city in Europe. The system is funded by local and central government and run by King’s College London from an operations centre at the Waterloo campus where researchers combine air pollution science, toxicology and epidemiology to determine the impacts of air pollution on health and the causal factors. During the London 2012 Games, researchers from King’s will monitor air pollution levels and provide this information to the Health Protection Agency (HPA) so it can assess potential health risks caused by air pollution during the Olympic and Paralympic Games.
WOMEN BETTER AT ENDURANCE?

Despite the growing popularity of extreme endurance events, the research surrounding this area is sparse. Often this is due to the remote location of the competitions, and them not being accessible for well-controlled data collection. When Sharon Gayter announced that she would attempt to beat the men’s world record for long distance running on a treadmill over seven days at Teesside University, the university decided to collect as much valuable data as possible without disrupting the event itself. From the 14 to 21 December 2011 Sharon set a new World Record for running seven days consecutively on a treadmill. She beat the previous female record holder Mimi Anderson, who ran 650km, by 182.73km, and the male world record holder, Lee Chamberlain, who ran 753.24km in July 2009, by 79.33km.

“This study was designed to track the physiological changes the body undergoes in an extreme event, and to quantify the overall demands of a seven day run.”

This study was designed to track the physiological changes the body undergoes in an extreme event, and to quantify the overall demands of a seven day run. Before her record breaking attempt Sharon underwent a thorough physiological assessment in the Teesside University physiology labs which gave the researchers a baseline measure of Sharon’s status, and allowed them to track any changes as the event progressed. Throughout the event the researchers kept a diary of what Sharon ate and drank, so they could calculate how many calories she consumed in relation to how many she used during her run. In this respect Sharon is quite unique, as she is very efficient and her body only used a small amount of fuel.

Being more economical and efficient is of benefit as this means that the body is able to use oxygen to break down stores of fat in the body to fuel the movement - fats are in much more abundant supply than carbohydrates. The tracking of blood values gave the researchers an insight into how hard the body was working, and how much the body deteriorated and fatigued over the seven days. The results of this study are still being analysed, but they could provide a useful insight into the impact of endurance events on the human body and help inform how best athletes can prepare for them.
SHAPE AND SIZE DETERMINE SPEED

World-class 100 metre sprinters are the purest example of human speed. Research at the University of Wolverhampton has set out to identify whether the relative shape and characteristics of world-class sprinters have changed over time and whether this has had an impact on how successful they were. The researchers looked at body size (height and mass) and the sprint times over 100 metres for both men and women in the world’s top-ten list of best all time performers. Using their height and mass the researchers calculated the body mass index (BMI) and Reciprocal Ponderal Index (RPI) of each athlete. The researchers found that BMI is an important factor associated with success in both male and female sprinters and suggests that muscle mass does influence speed and sprint performance. However, it is the RPI that emerged as the more significant factor in achieving success. Taller, more linear sprinters, such as Usain Bolt, achieve greater success as measured by sprint speed. The research suggests that coaches, selectors and sports scientists should consider body shape and size when selecting potential athletes for sprint events, especially those athletes with a high RPI.

RE-INCLUSION OF ATHLETES WITH LEARNING DISABILITIES TO PARALYMPIC GAMES

People with learning disabilities were treated the same as other disabled athletes until the Sydney Olympics in 2000 when the Spanish basketball team, who won the gold, were found to be cheating. They had deliberately recruited ten out of their 12 members without learning disabilities. As a consequence, this classification group was excluded by the Paralympic Association until a way to more robustly measure the disability and its impact on the sport could be agreed. Professor Jan Burns at Canterbury Christ Church University is a member of an International Paralympic Committee-sponsored international research group which has directly influenced the re-inclusion of athletes with learning disabilities in the Paralympic Games for London 2012.

Inas, the International Federation for sport for para-athletes with an intellectual disability, and the International Paralympic Committee funded an international research group to devise a robust classification system. Professor Burns explains: “A system of classification is necessary not only to recognise if the athlete is intellectually impaired, but how that disability impacts on their particular sport. For instance, with a physical disability if you are a left-handed amputee entering a pistol shooting event and are right-handed, then your disability is not interfering with your sport. But if you are a swimmer, not having a left hand would make a...”
difference. It is the same disability with a different impact. We have measured the types of intelligence needed for various sports. For example, to compete in the 100 metre sprint, you just need to know that when the gun fires, you must run in a straight line as fast as you can. For more complicated sports, such as basketball, you need to be able to recognise patterns and be able to anticipate and recognise feigns. We have isolated some of these cognitive skills and are able to measure them. This has allowed a limited return of this group of people back into the Paralympics, participating in swimming, athletics and table tennis. They have to qualify the same way as all Paralympians, by taking part in national and international competitions.”

WAR VETERAN TO PARALYMPIAN

Encouraging war-wounded people to use sport and recreational physical activity as a means of rehabilitation back into civilian life was the inspiration for the world-wide phenomenon of Paralympic sport. A new research study at Staffordshire University is examining the current rehabilitation processes with a view to further enhancing the competitive opportunities provided in and through sport. More specifically it is seeking to promote the use of elite Paralympic sport as a treatment option in the physical rehabilitation of injured war veterans.

The ultimate aim of the research is to develop a system of specific protocols to identify and support war-injured individuals who can participate and excel in a specific sport at an elite level. Head of Sport and Exercise, Dr Nigel Thomas comments: “If we can help war-injured people to be rehabilitated, but also guided by professionals into a suitable sport, we will create a new pathway for individual success at Paralympic level.”

This research will enhance the relationship between the medical and sports professions. The results of this research will have a substantial impact on the industry in developing focused products for specific Paralympic sport and sports participants. Whilst improving the performance of athletes in elite competition, the results would also lead to the development of clinical pathways for improving rehabilitation using sport. Furthermore, it will also help to improve the pathways from injury to participation and elite competition. Professor of Biomechanics, Nachi Chockalingam said: “The idea of the Paralympic Games started with World War Veterans. However our research reveals the percentages of veterans taking part in the Games are low and that no specific policies exist outside the US where it is expected that 15 per cent of the US Paralympic team will be made up of war veterans by 2012. This kind of policy could improve the growth of Paralympic sport.”

“It is expected that 15 per cent of the US Paralympic team will be made up of war veterans by 2012.”
Design is an essential part of the equipment used by athletes. This can include a car, boat or bobsleigh as well as a shoe, ball, javelin or swimsuit. If you look back in history the design of sporting equipment has changed dramatically to help improve performance and limit the amount of physical stress on an athlete’s body. The Formula One car is an example as well as the more humble tennis racket. Design works in parallel with technology to help give athletes that split-second or millimetre advantage over their competitor and in an age when the margins for success are getting smaller, this is more important than ever.

**SHOES AND SUITS**

In 2006 Prior Level 2 (P2L), an interdisciplinary design partnerships between staff at London College of Fashion, Loughborough University Rapid Manufacture Research Group and EOS GmbH Electro Optical Systems, launched the world’s first bespoke performance football boot ‘assassin’. Each boot is sculpted to the individual’s foot and the outsole is designed around the individual’s foot dimensions and unique walking/running style. The upper can be manipulated using sophisticated technology to adapt colour, appearance and function to the athlete’s needs. P2L’s system utilises a biomechanically optimised outsole (the base of the boot) that supports, controls and conserves the player’s musculoskeletal system. Individually positioned studs based on the athlete’s foot structure minimise peak forces on the foot whilst walking, running and sprinting. P2L develops relationships with players on an individual basis to help reduce injuries, improve comfort and performance over their entire career.

Researchers at Birmingham City University are also concerned with the design of athlete’s shoes, but in contrast to the design at P2L, they are looking into the aerodynamics of the running shoe. The researchers are interested in both the upper shoe design and the overall composition of the frontal aspects of the shoe. Previous research suggested that the orientation of the foot in a middle or long distance running has an important effect on drag and may have an impact on the energy consumption of long distance runners. This new research aims to discover if this is the case and how the design of a shoe to make it more aerodynamic can aid a runner’s performance.

“Swimming is a multi-billion pound industry, ranging from elite performance products to a lifestyle market that includes anything you would wear in or around water.”
Teesside University has played a vital role in the development of an innovative new product to provide a solution to the problem of cold hands for cyclists. BreezeBlockers offer a range of aerodynamic bike shields suitable for competitive, leisure or commuting cyclists, designed to provide protection for hands and feet in cold, wet and windy weather. The functionality of the product was tested in Teesside University’s environmental chamber which can simulate almost any environment on earth and is often used by athletes to experience extreme environmental conditions. The chamber can also be used to test clothing, equipment and occupational tasks in extremes of temperature in a scientifically controlled environment. The tests at Teesside showed BreezeBlockers can allow cyclists to train for longer by reducing levels of perceived exertion and lowering blood lactate levels. Because cyclists also felt warmer, there was no need for bulky gloves which reduce hand movement. Teesside academics also provided expertise interpreting and analysing the results.

Researchers at Birmingham City University have developed a ‘vibrating suit’ which may help users to dramatically improve their memory of physical technique. Once programmed, the smart suit will model human behaviour for a range of activities – such as sporting or movement techniques which demand accurate repetition of action – and gives immediate visual, aural and tactile feedback to a user if their movement is inaccurate. This feedback is delivered via vibrating contacts placed across the body at strategic points. The suit has many potential applications where a person needs to perfect a physical technique; this includes sports such as golf or Olympic activities like rowing. Lead researcher Professor Gregory Sporton said on average it takes 10,000 hours...
of dedicated training (the equivalent of 10 years) for an excellent athlete to become elite standard. The ‘vibrating suit’ has the real potential of reducing this time and indentifying inefficiencies or postural issues, with potential applications in areas as diverse as fast-tracking promising athletes, or improving lifting or sitting.

Stuart Morris, a UK Sport-funded researcher at The University of Nottingham, is Olympic Boat Designer for the GB Canoe Slalom team. His research has developed pioneering new ways to increase our knowledge of how a slalom kayak’s form can affect an athlete’s performance. A successful slalom kayak is a compromise between forward speed, manoeuvrability and stability defined by its physical form, allowing the athlete to maintain control in a race. Currently, kayaks are designed without any methodology for testing different kayak forms and assessing their effect on performance, so Stuart developed a methodology to allow superior kayaks to be designed. A series of identical kayaks were manufactured and iterative changes were made to areas of their form to determine the impact on performance. Field tests were then undertaken to compare the performance of each kayak. Canoe slalom races are regularly won and lost by tight margins. In the 2011 Men’s Kayak World Cup race, the different between gold and silver medal positions was a mere 0.15 seconds, so any performance advantage gained from improving kayak design could have a big impact on an athlete’s chances of winning medals at the Olympic Games.

**ENGINEERING BOBSLEIGH SUCCESS**

Technology at the University of Sheffield’s Advanced Manufacturing Centre with Boeing (AMRC) gave Britain’s best ice athletes a boost in their quest for medals at the 2010 Winter Olympics. Engineers at the AMRC Composites Centre helped develop the aerodynamic skeleton bobsleigh package that was used by Kristan Bromley and Shelly Rudman in the Winter Olympics. The high-performance engineering work, undertaken as part of the Bromley Formula Ice 2010 programme teamed AMRC engineers with partners Bromley Technologies Ltd and rapid prototyping company, Materialise Ltd. The programme aims to give the athletes equipment and technical support developed through research and development, and this ongoing development partnership enabled new aerodynamics for the skeleton bobs to be designed, rapid-prototyped, tested and produced in just seven days.

This was the second time experts at the AMRC were able to help British athletes in their quest for medals. As part of the same Bromley Formula Ice 2010 programme, apprentices at the AMRC teamed up to help the two-woman Bobsleigh World Champion pair during their preparations for the Winter Olympics. The apprentices used their manufacturing and engineering skills to machine the runners for the World Champion pair, which includes South Yorkshire’s Nicola Minichiello, using research and development carried out as part of Bromley Technologies Ltd’s Formula Ice programme.
ROLE OF DRAWING IN THE OLYMPIC GAMES

A research bursary in the Role of Drawing in the Olympic Games, based at the University of the Arts London, will explore the role drawing played in the planning exercise for the 2012 Olympic and Paralympic Games. From the colour of the walls in the Athletes’ Village to the plants in the Olympic Park; from the buttons on the Officials’ blazers to the way in which people move through the Olympic Stadium, every detail will have been meticulously considered. One thing these considerations have in common is that they all once existed as simple drawings, hand-penned propositions or Illustrator mock-ups. This research project is designed to explore these decisions by looking at the role of drawing in the Olympic Games.

SCIENCE-BASED PLANTING WILL BRING LONG-TERM BENEFITS

London’s Olympic Park is Europe’s largest new urban park for 150 years. The ambitious long-term vision for the site is to create a world-class visitor destination for the Games and transform it into a park for local communities over the next two years. Professors Nigel Dunnett and James Hitchmough from the University of Sheffield were appointed principal horticultural and planting-design consultants.

The Olympic Park presented an unusual challenge because the whole area is bound by a Biodiversity Action Plan (BAP). It was a condition of planning consent that the park provides 50 hectares of new habitat for wildlife, which means that almost all the green space on the site has had to contribute to the BAP. The Park and sporting venues will have several million visitors each day during the Games, so creating spaces that can meet people’s aesthetic and recreational needs and support biodiversity in the long-term was a major challenge.

“Creating spaces that can meet people’s aesthetic and recreational needs and support biodiversity in the long-term was a major challenge.”

The Sheffield team’s solution was based on years of experience and long-term scientific evidence. Their clever design and plant choices will enable the vegetation to evolve or be adapted during the two-year legacy phase when the games are over. The Natural Environment Research Council’s Biodiversity in Urban Gardens (BUGS) project provided insights into the value of urban gardens for native biodiversity and the benefits of different mixes of native and exotic plants. More information came from the long-term observation of native vegetation at Bibury near Gloucester; maintained by Sheffield since the 1970s. This is one of the longest, continuously monitored ecological experiments in the UK.

The result is a Park of two distinct parts. The bigger North Park has an informal, ‘country park’ feel and reflects native UK habitats, including the largest area of wet woodland habitat in the UK, and species-rich meadows which are a magnet for pollinating insects. Meanwhile the South Park, which includes the main Olympic stadium, has a more urban feel, with an emphasis on visual drama.
Design for Disabled Athletes

Students at Imperial College London are being challenged to design and build new types of sporting equipment for people with disabilities in the lead up to the London 2012 Paralympics, in an initiative funded by Rio Tinto. The aim of the Rio Tinto Sports Innovation Challenge is to harness the creativity of Imperial’s students in order to make sports more accessible to people with disabilities and to improve the sporting and training equipment available to them. For example, third year undergraduates in the Department of Bioengineering are aiming to develop technology for people with arm disabilities which, they hope could enable such people to take part in competitive rowing for the first time. As part of their project, teams from the departments of Civil and Environmental Engineering, Bioengineering, Mechanical Engineering and Electrical and Electronic Engineering will be encouraged to interact with one another, sharing their ideas and knowledge, and develop leadership and team skills. They will be joined by postgraduates studying for the MSc in Innovation Design Engineering, which is run jointly between Imperial and the Royal College of Art. The students will develop prototype technologies and manage their design project, writing reports, creating presentations and making log books. They will also have the opportunity to take part in summer projects and enter a ‘Dragon’s Den’ style competition, where their inventions will be judged by a panel of experts, with financial incentives for winning teams.

“The aim of the Rio Tinto Sports Innovation Challenge is to harness the creativity of Imperial’s students in order to make sports more accessible to people with disabilities.”
RAINFOREST TOUCH

Rainforest Touch is a colour-to-touch performance forestresponsive design by visually impaired athletes to enhance the experience of the sport visually. The design is inspired by nature and aims to improve the experience for visually impaired athletes. The design features the use of the green and yellow of the Golden Waratah. The red touches are reminiscent of the red of the Waratah. The white and blue are inspired by the blue of the sky and the clouds. The design is inspired by the experience of rainforest and the beauty of nature. The design is intended to be used in the context of a new sustainable road to before national road pace.
As well as being home to numerous elite athletes, UK universities focus the majority of sporting activity on increasing participation; generating new opportunities; and improving the student experience through sport. Each university, with support from BUCS, will have or will be developing ways to increase participation in sport and these initiatives may include competitive programmes, campus-based activity, mass participation events and community based initiatives. The Sport Development Team at BUCS and those within universities are also responsible for developing relationships with partners to improve sporting activities and increase participation. These partners can include National Governing Bodies, County Sport Partnerships, community clubs and facilities, academic departments and student unions.

INSPIRING PHYSICAL ACTIVITY

‘UP for Sport’ is a sport coaching scheme run by the University of Portsmouth, which provides opportunities for university students to share their sporting expertise with the local community. Students deliver structured coaching sessions with the aim of inspiring sports participation, improving performance and educating young people about the benefits of taking part in physical activity.

During the build up to the London 2012 Games the University of Portsmouth’s ‘UP for Sport’ volunteers are running a number of events to encourage youngsters to get involved in sport. One of these will involve over 250 pupils from local primary and secondary schools competing in an annual ‘streetdance’ competition. The pupils will be trained in ‘streetdance’, (a hip-hop dance style made popular on the streets of America), by University of Portsmouth students. The best dancer in the competition will be offered a dance scholarship to train with the university’s community streetdance group Most Wanted.

The University of Ulster’s Sports Outreach programmes encourage young people to be more active using the Olympic and Paralympic Games as inspiration. It has received national recognition and LOCOG has given the London 2012 ‘Inspire’ mark to the Sports Outreach Unit’s Sport for Life, Sport for Life Legacy and School Sport Legacy programmes.
The first project, ‘Sport for Life’, was launched in January 2010 to encourage primary school children to participate in physical activity for life. Around 100 schools and 3,000 pupils from disadvantage areas signed up for a 12-week programme, delivered by Ulster Sports Academy student volunteers in partnership with professional teachers. Following on from this initiative, which concluded in June 2011, the Sport for Life Legacy programme was developed. It offers primary school teacher trainees a two-day intensive Sport for Life course. This is creating a sustainable legacy for children to benefit from the programme in schools across Northern Ireland in the future.

The most recent programme to receive the Inspire mark, the School Sport Legacy Programme focuses on a variety of indoor and outdoor Olympic sport participation sessions and workshops in schools. Dr Deirdre Brennan, Director of Sports Outreach at Ulster, said: “Ulster Sports Outreach is dedicated to the provision of high quality work based learning opportunities for students in the Ulster Sports Academy. Our student volunteers who service these programmes are the real champions of the Inspire projects we deliver and we are indebted to them. Their contribution makes a significant positive impact on school sport and physical activity within the province.”

‘Flames: Lighting the way’ is a healthy lifestyles educational programme which aims to increase children’s awareness of physical activity and health by giving them fun and positive experiences so they can learn healthy habits for life. The programme aims to include children of all sporting abilities and draws on inspiration from the Olympic and Paralympic aims and values. A larger number of UK universities have been involved with ‘Flames’, including the University of Gloucester where students organised a launch event to introduce the ‘Flames’ programme to local primary school teachers. The event included opportunities to take part in a range of sports including; rugby league, martial arts, Take 6 Basketball, football, and dance. The University of Wolverhampton also hosted a series of ‘Flames’ events including free training for university students and staff with the aim of providing physical activity sessions to schools and young people. The university used a range of sporting activities to deliver the programme including relays, agility games, and skipping. Other universities involved in the ‘Flames’ programme include Loughborough, Manchester, Anglia Ruskin, Plymouth and the University of the West of Scotland.

“Flames: Lighting the way’ is a healthy lifestyles educational programme which aims to increase children’s awareness of physical activity and health by showing them fun and positive experiences.”
“This initiative aims to give thousands of students across the higher education sector a chance to try out a new sport, or get back into one they’ve tried before.”

ACTIVE UNIVERSITIES

In April 2010 Sport England, announced £10 million National Lottery funding for ‘Active Universities’. Supported by BUCS and the higher education sector, this investment will give thousands of students a chance to try out a new sport, or get back into one they’ve tried before. Forty two projects involving 70 universities are benefiting from this funding over three years. These projects have developed innovative ways of engaging more students in regular participation in sport, through the employment of new coordinators, building new relationships with National Governing Bodies of Sport and developing new tools and resources to enhance opportunities locally. Through Active Universities, Bucks New University was awarded over £300,000 of National Lottery funding from Sport England to revolutionise the opportunities for students to participate in sport at the university. The university has forged a close relationship with England Hockey and supported the national launch of their new participation programme ‘Rush’. ‘Rush’ hockey is a small-sided version of the traditional game, with smaller pitches, smaller teams and fewer rules. Through this adapted version of the sport, England Hockey hopes to build a lasting legacy which will continue long after the London 2012 Olympic and Paralympic Games have finished. Through Active Universities, Bucks New University has now established a weekly regional Rush league.

The Active Universities project is also having a major impact on sport at universities in Nottingham, with new activities illustrating how sport participation programmes can get more people to be active regularly. The ‘Nu2 Sport’ project is a collaborative programme, jointly managed by University of Nottingham and Nottingham Trent University. In the first term of activity the project offered a variety of sports, including rugby and handball, and resulted in more players taking part in the BUCS competitions.

At the start of the year there was concern that the university’s women’s rugby club was struggling to attract players and was in danger of losing their place in BUCS. To assist, the ‘Nu2 Sport’ project funded a six week block of beginners only rugby, teaching girls the basics..."
of the game away from the more experienced players in a non-traditional environment. The first four sessions took place indoors, before moving outside and into a contact environment when the girls were ready. The result has been fantastic with 10 new girls joining the rugby club, almost doubling membership.

Sheffield Hallam University was awarded over £270,000 of funding to get more students playing sport. A survey of the university’s students was carried out to discover what sport they were currently doing and what sports they would like to do. The findings showed that 44 per cent of students were doing less sport than before they came to university, but 77 per cent wanted to do more than they are now. Dan Porter, Head of Sport Services at Sheffield Hallam, said: “The funding from Sport England will help us provide even more opportunities for students to get into a range of sports, some of which they might never have considered before. Hopefully it will also lead to continued participation in sport beyond their university life.” The funding bid was put together by a partnership between the university, the Students’ Union and local sport facility providers, who have provided additional facilities for sport activities to take place.

At Bournemouth University, the ‘Free Your Fitness’ project encourages students to get involved in a wide range of social and engaging sports or physical activities. It aims to raise awareness of sport and higher standards of participation and interest in Olympic endorsed sports. Developed in partnership with BH Live Trust and National Governing Bodies of Sport, ‘Free Your Fitness’ will provide opportunities which are either heavily subsidised or free. From aerobics to Zumba, in a gym or outdoors, on land or water - there is something for everyone.
UNIVERSITIES AND NATIONAL GOVERNING BODIES

National Governing Bodies (NGBs) of Sport are responsible for the organisation and planning of their specific sport across the country. They are at the heart of sport development as it is their networks of community clubs, coaches and volunteers that make sport happen. Over the past two years NGBs have started to work very closely with UK universities, supported by BUCS to help deliver and sustain participation in their sport.

BADMINTON

BADMINTON England’s Higher Education Officer programme has been in place since 2010, with 12 universities involved in 2010, 35 universities involved in 2011 and the plan to extend to 50 universities in 2012. The main aim of the programme is to increase the number of students and members of the local public involved in badminton. In its first two years the programme has achieved great success across all universities. The officers have collectively attracted over 6,000 students, staff and local residents into badminton, with over half of these being new to the sport. Together, the university and BADMINTON England recruit a student or pair of students to take on the voluntary role of Higher Education Badminton Officer. Each officer works with their university sport development units and BADMINTON England Regional Officers to increase and enhance the badminton activity available across campus.

VOLLEYBALL

In 2010 Volleyball England launched the Higher Education Volleyball Officer (HEVO) programme. The HEVO programme offers students an opportunity to work with the National Governing Body and their university on a voluntary basis to lead and co-ordinate the development of volleyball at the host institution. The aim of the HEVO is to encourage new players to come into the sport and to ensure all players have a quality experience at whatever level they participate. After only a year, the HEVO programme was thriving with 54 student HEVOs in place, 1,600 students participating weekly through the programme, 30 students qualified as coaches, 33 students qualified as referees and 667 students having attended volleyball festivals. Steve McMahaon, the HEVO at Middlesex University had a difficult task at his university. Before he started in the role there was no volleyball club or activity in place. As a result of Steve’s hard work the volleyball club now has 35 regular attendees and is the most popular sports club at the university behind football.
TENNIS

Tennis is another sport which has made good use of a student workforce to increase participation. The University Tennis Coordinator programme was established in 2009 with the aim of growing the game and encouraging university students to become more involved in tennis. The programme also creates a first step into the tennis industry for the coordinators who have an ideal base from which to become a future part of the workforce for British tennis. Each coordinator is in position for two years, working to grow tennis at their university, while also studying for a part-time post-graduate degree. Receiving an annual salary of up to £10,000 they work to increase the number of students attending, tennis taster sessions, organised play, coaching and competition. They also work to increase the number of students training to be competition organisers, coaches and referees.

Over the last three years Durham University Tennis Club has grown from a student run competitive club into one of the largest and most successful sports clubs in Durham through the work of a University Tennis Coordinator. Last year the club has its most successful year to date with five BUCS league titles, a cup win and finalists in BUCS individuals. The University of Exeter has also achieved fantastic things through the programme. The first academic term of 2011/12 was incredibly successful in terms of the number of members and those that have a British Tennis Membership. Currently 88 per cent of the club are British Tennis Members. These successes are the result of the University Tennis Coordinator.

JUDO

British Judo has also worked with a large number of universities in the last year, but has taken a slightly different approach. For the second year British Judo has introduced their Student Voucher Scheme to universities across the country. The idea behind the scheme is to increase the number of new participants in the sport within current higher education judo clubs and to support the development of new judo clubs at universities. The programme aims to break down the financial barrier to starting judo, with various vouchers offering everything needed to take up the sport. Through the programme various university judo clubs, in partnership with their Regional Development Officer, managed to recruit over 300 new participants to the sport. The second year of the scheme saw British Judo expanded the programme to target 65 universities, with an emphasis on expanding the sport further and establishing new clubs. Currently over 400 new students have taken up the Student Voucher Scheme nationally. The University of Warwick has seen a huge growth in Judo club membership as a result of the scheme. In the 2010/2011 academic year the club managed to increase membership by about 50 per cent. Andrew Wilesmith, Eastern Regional Development Officer and higher education lead for the programme said: “This programme offers so much too so many. It breaks down the initial financial barriers for students, and offers them a chance to progress to their 6th Kyu and because of this we give them an incentive to stay in the sport. We also have something to take to the universities. It is a difficult sport to amend, unlike a number of other sports so we are showing our commitment to the sector and our higher education partners with this project. We come to the table with something tangible and beneficial to both the student and the university”.

SECTION FOUR : SPORT DEVELOPMENT AND PARTICIPATION
This year, London will make history as the only city to have hosted the Olympic Games on three occasions. It is an honour which befits a city that has played such an important part in helping to support the Olympic movement. London stepped in to host the 1908 Games at short notice and held the first Olympic Games following the Second World War in 1948, at a time when the world was still at odds. Much has changed over the last 64 years, but it is hoped that the 2012 Games will go down in history as one of the best yet.

LONDON: SAVIOUR OF THE MODERN OLYMPICS

Building upon the legacy of the Ancient Olympic Games, since 1896 the Modern Olympic Games has provided an opportunity for countries to come together regularly in friendly rivalry in the sports arena. But it has not always been easy. Frequently, the Olympics’ sporting dimension has been qualified, even threatened, by political and commercial factors.

Peter J. Beck, Emeritus Professor of History at Kingston University, has researched Britain’s relationship with the Olympic Movement, with specific reference to issues arising from hosting the Games. In 1908 London, although stepping in as host at almost the last minute, delivered the Games and the first purpose-built Olympic Stadium. Moreover, Olympism also emerged much strengthened from London 1908, frequently described as ‘the first true Olympics’.

“Forty years on, in the summer of 1948, London took on the task of getting the Olympic movement back on track again after the controversial 1936 Berlin Olympiad and the lengthy gap following the suspension of the Olympics during the Second World War. London’s task was not helped by post-war austerity and the beginnings of the Cold War, but London 1948 placed an emphasis on the Olympiad as sporting ‘Games’. During the opening ceremony held at Wembley Stadium, the scoreboard carried the famous words of Pierre de Coubertin, the founder of the Modern Olympics: “The important thing in the Olympic games is not winning, but taking part. The essential thing is not conquering, but fighting well.”
London 1948 established Olympism’s ability to bring together people from different nations living in an increasingly divided world. For Emil Zatopek, the Czech 10,000 metres gold medalist representing a country which had recently been incorporated into the Soviet bloc, his world view was transformed by participation in London 1948. He said: “I went into the Olympic village and suddenly there were no more frontiers, no more barriers, just the peoples meeting together.” Professor Beck believes this rich history suggests that London 2012 will help develop the UK’s longstanding relationship with the Olympic Movement, to rebuild and strengthen Olympism and to support new directions for Olympism like legacy.

HISTORY OF SPORTS MEDICINE

The Olympic and Paralympic Games provide a unique opportunity to examine athletes and the impact of high performance sport on their bodies. Dr Vanessa Heggie, a Wellcome Trust-funded Teaching Associate at the University of Cambridge, has looked into the history of sports medicine and how it has evolved. In her book ‘A History of British Sports Medicine’ she explains that it wasn’t until 1928 when the Association Internationale Médico-sportive (AIMS), was founded that it was possible for an international team of doctors and scientists to examine athletes. In that year, two doctors from Manchester, Crighton Bramwell and Reginald Ellis, noticed that marathon runners had exceptionally stable resting pulse rates, something we now attribute to the high fitness level the marathon requires. At the time, they suggested this might be because of the phlegmatic temperament of the marathoner, compared to the more ‘highly-strung’ sprinters. It was through examinations like these that the extraordinary nature of the elite athlete became apparent. They have unusually low resting heart rates, massive lung capacities and phenomenal muscle development.

AIMS still exists to this day, but in 1934 changed its name to the Fédération Internationale de Médecine Sportive. In 1948 when Britain hosted the Olympics for a second time in London, rationing was still in place. Athletes were given special dispensations to consume more calories than the average physical labourer, and special restaurants were set up to provide the extra food, and so research began into the effect of food on an athlete’s diet.

The 1968 Olympic Games took place in Mexico City. At 7,500 feet above sea level this caused fears about the altitude, with one Gold medal winner Chris Brasher claiming that some athletes might even die in Mexico. Further research was commissioned into what effect altitude might have on health and performance. This research found that some high-profile events might actually be positively affected, as the lower air resistance improved performances. However, the research also found that endurance events would be negatively affected by the lower oxygen partial pressure in Mexico City. With increasing security at the Olympic Games, it has become far less common for research to take place at the Games themselves. However, the events have continued to provide the inspiration for thousands of clinical and scientific studies, which have has an impact on medicine much wider than just within sport.
THE CEREMONY OF OPENING AND CLOSING THE GAMES

Olympic opening and closing ceremonies are a time when the eyes of the world focus on the host country. Professor Helen Gilbert from Royal Holloway, University of London has looked at the history of these ceremonies, what they have said about the host country and what they sought to display to the world.

In particular, Professor Gilbert has researched the complexities of Aboriginal and native people’s participation in opening and closing ceremonies in Canada, Australia and the United States, and the difficulty in translating cultural traditions for a vast media audience. She has found that although the host country ideally wants to display a united front to the world, many indigenous people's performances in Olympic ceremonies have subtly highlighted particular concerns and contradictions.

Professor Gilbert now hopes to chart these historic messages by looking at specific Olympic performances in ceremonies across the past 35 years in her work funded by the European Research Council. “The Olympic ‘spirit’ promotes utopian notions of a ‘common humanity’ that asks us to put personal and political tensions aside”. Professor Gilbert says. “Amid this celebration of global communitas, rigid formulas for Games ceremonies govern what can be said and shown. Nevertheless, key issues in the cultural politics of host nations are often writ large on the global stage during Games ceremonies, and they are certainly under tremendous scrutiny.”

“Although the host country ideally wants to display a united front to the world, many indigenous people’s performances in Olympic ceremonies have subtly highlighted particular concerns.”
MODERN PENTATHLON CELEBRATES ITS CENTENARY

2012 will be an extra special year for one sport which will celebrate 100 years as an Olympic event. Modern Pentathlon was created by Baron Pierre de Coubertin, one of the founders of the modern Olympic Games and made its debut at the Stockholm Games in 1912. It was De Coubertin’s admiration for the ancient pentathlon, where pentathletes compete in the discus, javelin, jumping, running and wrestling, which led him to create the modern version in which competitors master the five sports of show-jumping, shooting, fencing, swimming and cross-country running. The University of Bath has produced all four of modern pentathlon’s GB medallists since 2000, the year when women were first able to compete, when Steph Cook and Kate Allenby achieved gold and bronze for Team GB.
PRESENT: REGENERATION

In preparation for thousands of people descending on London for the Olympic and Paralympic Games in 2012, the UK has to prepare for an influx of tourism; look at how to home thousands of athletes; and deliver world leading sporting facilities. The London 2012 Games have bought investment that has helped regenerate communities and this will have a far reaching impact well beyond the closing ceremony. The Games have provided opportunities for universities to gain a unique perspective on how the Olympic and Paralympic Games effect social and physical regeneration and measure the benefits of a socially unique global event. From the sustainability of the Olympic Village, to the UK’s future ability to host ‘mega events’, UK universities are in a unique position to identify the needs and highlight the potential benefits of the Games, ranging from infrastructure to employment.

SOCIAL REGENERATION

The University of East London, at the heart of the Olympic Village, has conducted research about urban regeneration, focusing on the economic, social and cultural development of East London and the Thames Gateway. The London 2012 Games is physically transforming East London by improving infrastructure, including the Olympic Park itself, which will help drive renewal and regeneration in the area. The research is also looking at the potential of the Olympic and Paralympic Games to create positive social benefits in housing and health and wellbeing. The Games have the opportunity to transform London into a ‘world city’ by bringing East London into the modern mainstream of economic and social life.

The University of East London has partnered with Architectural and Urban Technology Research Nucleus of the University of São Paulo and Gama Filho University, Rio de Janeiro, Brazil, to examine the impact of mega events on urban development and social change. To date the project has run a series of international seminars and papers fostering relationships between the two countries in the run up to London 2012. The project is ongoing and aims to make a positive contribution, both locally and internationally, to the study and analysis of urban change and how this relates to the respective nations’ intentions to host other major sporting events in future years.

While the University of East London has focused on local regeneration needs, the University of Surrey has focused on personal and economic regeneration as a result of the Games.

“The research is also looking at the potential of the Olympic and Paralympic Games to give positive social benefits in housing and health and wellbeing.”
and how this will help inspire the skills of hard to employ people in London and across the UK. The research has also looked at the true and future value of volunteering, apprenticeships, training and job creation schemes and the effects these will have on social regeneration following London 2012.

**LEGACY**

The Olympic and Paralympics Games do not only effect the host city. They also have an impact on the surrounding areas and the country as a whole. Loughborough University is conducting research into the range of policy measures introduced to actively promote and leverage the social, economic and cultural benefits of London 2012. The researchers are looking at the regeneration of East London and aim specifically to study the effects on the Leicestershire area and the benefits the Games will have on this region. The research project is ongoing until October 2013 and will provide government with full and detailed information to understand and demonstrate the long-term impact of the Games, not just on London, but on a regional scale.

Similarly, the University of Westminster’s supply chain management department is working with London boroughs and councils to adapt supply chain processes to cope with the challenges of providing for an increased temporary population. This joint project has been very important in evolving and modernising the supply chain process and this will have far reaching benefits beyond London 2012.

“The researchers are looking at the regeneration of East London and aim specifically to study the effects on the Leicestershire area and the benefits the Games will have on this region.”
GRASS ROOTS DEVELOPMENTS

First year architecture and interior architecture students at London Metropolitan University are designing a ‘pop-up’ initiative of models, ideas and proposals to make ‘High Street 2012’ ‘a Place of Pleasure’, in Aldgate, East London. ‘High Street 2012’ is a project to improve and celebrate one of London’s great high streets and is part of the London Festival of Architecture. The Festival aims to highlight London’s building design and construction to a global audience just weeks before the start of the Games. Using abandoned spaces to create ‘garden rooms’ the project is one of the biggest of its kind to encourage students to gain experience working with some of the largest organisations in the university’s local community.

The University of Sheffield has played a unique role in London 2012. PhD student Helen Hoyle has produced trial plots at the Olympic venues where she has manipulated native London plants to delay the flowering process by six weeks to produce a spectacular flowering display in East London during the opening ceremony.

“The Festival aims to highlight London’s building design and construction to a global audience just weeks before the start of the Games.”
PhD student Helen Hoyle

Trial plot next to velodrome in Olympic Park
An important part of London’s bid to host the 2012 Olympic and Paralympic Games was dedicated to leaving behind an important legacy. Since then there has been debate about what the legacy might look like and whether what is forecast is actually achievable. University researchers have contributed greatly to this debate and it has become clear that the legacy of London 2012 will be its impact on the economy, society, wellbeing and health of the UK.

**ECONOMIC IMPACT**

Research shows that London 2012 could help generate long-term economic growth in the UK, with far reaching benefits across the health and fitness sector, sports industry, local communities, UK tourism and many more.

In the health and fitness sector, Sheffield Hallam University’s Sports Industry Research Centre (SIRC) has found that over the last 20 years the sport industry has continued to take a greater share of the national economic activity, which will be accelerated by London 2012. Overall, SIRC estimate that the ‘Olympic factor’ will help the UK’s £20.7 billion sporting economy expand by two per cent in 2012 and increase further over the next three years. In particular, the research shows that the sports clothing industry is predicted to grow 15 per cent to £5 billion and the sports gambling industry will be worth £3.2 billion, an increase of nearly six per cent.

“London 2012 could generate long-term economic growth in the UK, with far reaching benefits across the health and fitness sector, sports industry, local communities and tourism.”
The Centre also believes that the sporting legacy from the World Student Games held in Sheffield in 1991 is the perfect template for the London Olympic Games. Researchers found that Sheffield’s £147 million investment has had a proven return on investment in the medium and long-term. In total, between 1991 and 2010, it is estimated that the major sports events programme co-ordinated by the Council and its partners in Sheffield has generated a total of £113 million within the city’s economy. Additionally, many non-sport events make use of the major facilities built for the World Student Games, so the total figure is likely to be far greater than £113 million. Without the investment in these facilities, Sheffield would not have been able to host many major events such as the 1996 World Masters Swimming Championship which generated £3.9 million additional expenditure in the city.

“Over the last 20 years the sport industry has continued to take a greater share of the national economic activity, which will be accelerated by London 2012.”

Focusing on the cost to local London Borough Councils, London School of Economics research helped secure £21 million in government funding for additional costs such as cleaning, waste management, licensing, trading standards and traffic management which would be incurred during the Games. The report highlighted the challenges for local government to fund additional services and informed discussion with government departments about the additional costs and how best to meet them.

The impact of the London 2012 Games on tourism has been assessed by researchers at Bournemouth University. The work helped secure political support for the London 2012 bid by estimating the number of foreign visitors to the London 2012 Games, how much money the visitors would be spending, where they would be spending and what they would be spending their money on, before, during and after the games. The benefits of Olympic related tourism were found to be positive and largely relative to the investment in the original bidding process.
LIFELONG HEALTH

Physical inactivity is a major health concern in the UK, costing the NHS an estimated £8.2 billion a year. The national focus on sport expected to be generated by the London 2012 Games is set to reduce this financial burden as the health and fitness sector grows. Recognising this, the University of Westminster is currently researching the possible health and economic benefits of active commercial computer gaming. The research is looking at how recent developments in computer gaming units could have widespread potential health benefits for people suffering from type 2 diabetes. The researchers will compare the amount of energy used during active computer gaming as opposed to using more traditional forms of exercise such as a treadmill.

Research at Glasgow Caledonian University has investigated the benefits of exercise to older people. Researchers have assessed which kinds of exercise older people should carry out to improve their balance, and potentially reduce their risk of suffering a debilitating fall. They examined 94 studies, involving over 9,000 participants, to identify a list of exercises that elderly people could do at least three times a week to work on their balance. The research found that practising Tai Chi, dancing and yoga had the potential to improve balance. Meanwhile, cycling and walking, although beneficial for general fitness, did not have the same positive effects. The research team believes that the legacy of the Olympic and Paralympic Games is not just about top-class athletes, it is also about encouraging and maintaining lifelong health for everyone.

BOOSTING INTERNATIONAL LANGUAGES IN SCHOOLS

“The ‘Routes into languages’ project aims to reverse the decline of language take-up by school pupils at GCSE level and above.”

One cross-university research project has been looking at how university language departments can help make the most of the Olympic Games. The ‘Routes into Languages’ project aims to reverse the decline of language take-up by school pupils at GCSE level and above. A number of Olympics themed activities have been planned, with local schools invited to take part in a physical activity with a language element. At one such event at Loughborough University, pupils were asked to work on activities around creating and marketing a pitch to an overseas team. They were then asked to make the pitch in a foreign language of their choice to a panel of judges. The winning team won a trip to the View Tube by the Olympic stadium.
Further information can be found at
www.universitiesweek.org.uk

Or you can contact us at
info@universitiesweek.org.uk

2 MAY 2012