

No other university has achieved
such a dramatic transformation in fortunes
in the past five years.

The Times/Sunday Times Good University Guide 2015

6th

Climbing up the league tables

Surrey has risen in all three league tables for UK universities, moving from eighth to sixth place in *The Guardian* league table 2015, our highest ever ranking. We climbed to eleventh position in *The Times/Sunday Times Good University Guide* and achieved twelfth place in *The Complete University Guide 2015*.

We jumped two places to ninth in *The Times Higher Education Table of Tables 2015*. The prestigious league table is based on the combined results of the UK's three main university league tables: *The Times/Sunday Times Good University Guide*; *The Guardian* and *The Complete University Guide*.

£70m

Signed up for 5G

A consortium of key global players has pledged support of £58 million for our 5G Innovation Centre programme in addition to the £11.6 million awarded by the Higher Education Funding Council for England from the UK Research Partnership Investment Fund. The group consists of some of the world's leading mobile network operators, infrastructure and tools providers, media and communications organisations as well as our regional partner, EM3 LEP.

Due to open in spring 2015, the 5GIC is located on the University's Guildford campus and will be home to over 150 researchers and 100 PhD students.

1st

Graduate employability

New figures from the Higher Education Statistics Agency (HESA) reveal that the University of Surrey is ranked in first place for graduate employability when compared with chartered universities in England.

The figures reveal that 97 per cent of Surrey's 2013 graduates were in work (or further education) six months after they graduated – up 4.2 per cent from the previous year. These figures demonstrate the University's focus on graduate employability and the success of Professional Training placements.

4th

Student satisfaction

Surrey has been ranked fourth for Student Satisfaction in *The Times/Sunday Times Good University Guide 2015*.

The fourth position is an average based on the University's performance in seven key areas of the National Student Survey (NSS): Teaching; Assessment & Feedback; Academic Support; Organisation & Management; Learning Resources; Personal Development and Overall Satisfaction.

In the 2014 NSS, the University was ranked eighth out of 135 institutions achieving an overall satisfaction rating of 91 per cent.

► An overview of 2014 from the Vice-Chancellor



Without continual growth and progress, such words as improvement, achievement, and success have no meaning.



Benjamin Franklin

Scientist, statesman, writer and diplomat

The University has made significant investments in its growth and progress over recent years with a focus on excellence. As a result, 2014 has seen one of our best years academically here at Surrey.

We reached our highest rankings in the three main national league tables and in the National Student Survey, ranking sixth in *The Guardian* league table and ninth in *The Times Higher Education Table of Tables 2015*. We attracted a wealth of highly talented applicants and achieved record growth in student numbers, with October 2014 seeing the University's largest ever undergraduate intake whilst maintaining our high entry standards.

This is testament to our efforts to create a learning environment which focuses on the needs of our students. Since the first students passed through our doors in 1891, we have been giving them a competitive edge for the future: enabling them to not only succeed academically but to develop much valued skills and real experience.

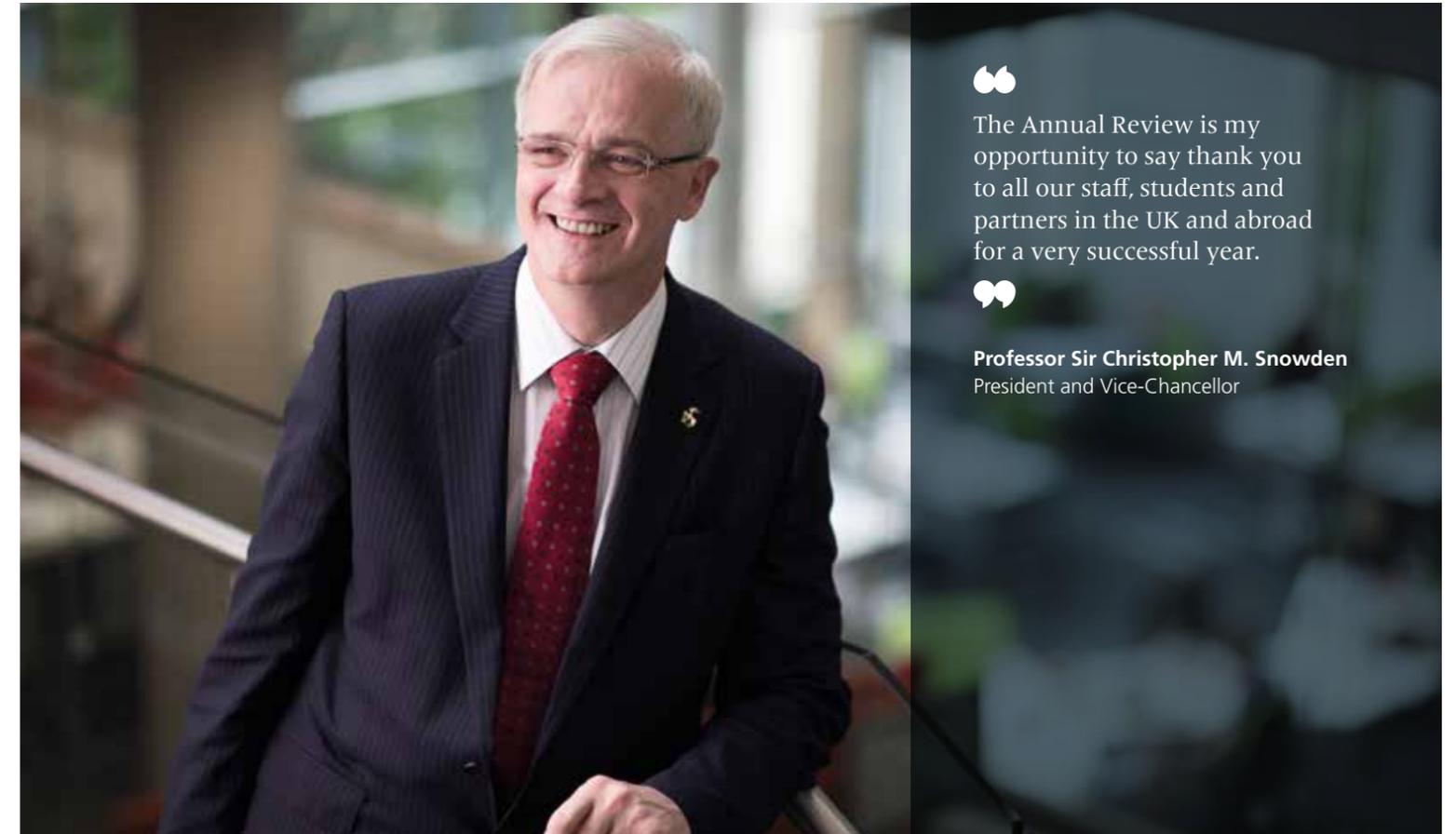
Through our pioneering Professional Training programme, our students undertake high quality paid work experience placements enabling them

to demonstrate their talents to employers. This has underpinned our continuing record as one of the leading UK universities for graduate employment with 97 per cent of our graduates in employment six months after leaving us – the highest level in English universities.

Our students are being taught, supported and inspired by some of the best minds from around the world. This year, we have continued to make a considerable investment in the quality and number of our academic staff, helping to shape our status as a leading university.

We have world-leading academics who are forming important partnerships and working closely with international industry and commerce to create new thinking and practical solutions to some of the challenges we face in today's society such as communications, CO₂ emissions, health and wellbeing, energy supplies, cyber security and sustainable tourism.

Our new £45m School of Veterinary Medicine is being built around the theme of One Health, One Medicine. The new School will be delivered through alliances with an extensive network of partners in clinical practice, research and industry to provide an



The Annual Review is my opportunity to say thank you to all our staff, students and partners in the UK and abroad for a very successful year.



Professor Sir Christopher M. Snowden
President and Vice-Chancellor

6th

IN THE GUARDIAN
LEAGUE TABLE
2015

£1bn+

REGIONAL
ECONOMIC
ACTIVITY
STIMULATED
ANNUALLY
BY SURREY

outstanding training environment for our students, as well as for practising veterinary surgeons, veterinary nurses, para-professionals and clinical scientists.

Collaboration with key partners has been fundamental in establishing Surrey's £70 million 5G Innovation Centre programme. Construction of the building is nearing completion with thanks to the initial funding from the Government. With support from a consortium of mobile network operators and organisations, the first research programme of its kind in the world will spearhead the development of mobile communications networks, address the concerns of rising levels of data traffic and bring momentum to this vital area of economic growth.

Together with the University's wholly-owned Research Park and its tenants, Surrey already stimulates over a billion pounds of economic activity annually in the regional economy. We believe our future plans will further strengthen the prosperity of the region.

The 2014 Annual Review showcases what has been a year rich in improvement, achievement, and success for Surrey, especially set against the highly competitive environment and funding challenges facing universities today.

Professor Sir Christopher M. Snowden FRS, FREng
President and Vice-Chancellor

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GLOBAL CONNECTIONS

Internationalisation permeates all that we do at Surrey and contributes significantly to realising the University's mission to solve global challenges, lead research and innovation, and fuel generations of students with a spirit of curiosity and a desire to improve the world we live in. Here we highlight our global research impact and international partnerships.

GLOBAL RESEARCH IMPACT

Australia

Staff in the School of Psychology are working on multiple research studies on Cognition and Motivation with the University of Melbourne.

Brazil, University of Sao Paulo (USP) – UGPN Partner

Staff at the Surrey Veterinary School are working with our partners at North Carolina State University and USP to develop better ways to monitor and control resistance to antibiotics in food animal production.

China

Surrey researchers have been investigating air pollution and particle number size distributions at thirteen different sites in China.

Surrey staff have worked with Peking University carrying out water exchange experiments using treated wastewater in an artificial landscape.

France, Germany & Switzerland

Surrey's strong participation with leading European radioactive-beam facilities is leading to new understandings of energy applications.

Germany

Our partnership with TU Dresden and Kings College London is shaping the future of 5G technology.

India

A research team consisting of experts from Surrey and institutions in India have been awarded £981,717 for their project working to develop cheaper diagnostics tests for bovine TB and a vaccine to be used alongside it.

Japan

Staff at the University of Surrey are working with various partners in Japan investigating developments in Neutron spectroscopic factors.

Kazakhstan

The Republic of Kazakhstan is working with Surrey Satellite Technology to create a national system which will support its government with resource and environmental monitoring for policy and decision making.

Sub-Saharan Africa

The 3K-SAN project is developing and evaluating strategies for catalysing self-

A selection of our research projects worldwide



sustaining sanitation chains in low-income informal settlements in Kenya, Uganda and Rwanda.

USA, California

Surrey Professor Craig Underwood is directing the UK's involvement within the 'AAReST' (Autonomous Assembly of a Reconfigurable Space Telescope) project with the California Institute of Technology.

USA, North Carolina State University – UGPN Partner

Staff in the Maths Department are working with colleagues at NC State and USP on a project entitled 'An Interdisciplinary Approach for the Prevention, Treatment and Control of Hepatitis C Virus Infection'.

Staff from both universities are working on a project looking at aerodynamic modelling for flight dynamics simulation.

USA, Tennessee

The University has a long history of working with Oakridge National Laboratory in the area of nuclear physics and engineering.

► Surrey on the world stage

Sustainable partnerships are fundamental to Surrey's International Strategy.

The University of Surrey is ranked 39th in the prestigious Top 100 world's most international universities by the *Times Higher Education* (THE). A total score of 83.5 was awarded for Surrey's International Outlook – this is assessed on a university's international student numbers, its percentage of international staff and the proportion of its research papers published with a co-author from at least one other country. Professor Vince Emery, Pro Vice-Chancellor (International Relations) commented, "This result reflects the outstanding international profile of both the staff and student body at the University of Surrey, and also the University's commitment to being a global University in all its endeavours."

The world's top Universities also include a number of Surrey partners including University of Hong Kong, Nanyang Technological University and the University of Sydney.

The University has many strategic partnerships and during the year of report has signed new agreements for academic co-operation with high profile Chinese Universities such as Sun Yat Sen as well as a series of agreements with scholarship providers in Vietnam and with Tullow Oil who sponsor African students to undertake study in the UK.

The University of Surrey continues to be a very attractive destination for Brazilian students through the Science Without Borders Scheme – during 2013/14, 62 students including five PhD students have been studying at the University as part of their degree programme.



This result reflects the outstanding international profile of both the staff and student body at the University of Surrey, and also the University's commitment to being a global University in all its endeavours.



Professor Vince Emery

Pro Vice-Chancellor (International Relations)

Chinese collaboration

The University has a significant ongoing partnership with Dongbei University of Finance and Economics (DUFE) in China, with the jointly run Surrey International Institute (SII). Offering business programmes using a 2+2 format permits students to graduate from both universities and complete their studies either in China or the UK. The University has its own academic staff based in China and, having recently passed a QAA audit, reflects the University's continuing commitment to quality assurance. Students within SII partake in a full-campus experience with a broad array of scholastic and extra curricula activities offered. The percentage of SII students receiving good degrees has steadily climbed over the past four years to be on a par with the home campus.

With recent changes to the DUFE leadership team, the Vice Chancellor led a senior delegation to China in October 2014 for an annual meeting where both universities committed to enhancing their relationship and strategic objectives.



1,667

STUDENTS AT
SII-DUFE, CHINA

► The University Global Partnership Network



The Universidade de São Paulo, North Carolina State University and the University of Surrey are the founding members of the University Global Partnership Network (UGPN). Through this network, the three universities are developing joint research activities as well as providing opportunities for students to undertake study or research placements at the partner universities.

Five-fold increase in undergraduate and postgraduate student and staff mobility between the UGPN partners.

Mission and impact of the UGPN

The mission of the UGPN is to develop sustainable world-class research, education and knowledge transfer through an active international network of selected universities collaborating in research, learning and teaching to benefit our global society. The depth and breadth of the relationship between UGPN members has continued to expand during 2014 resulting in a range of new opportunities across academic disciplines including contributing to our One Health agenda.

To date the UGPN has achieved:

- » A five-fold increase in undergraduate and postgraduate student and staff mobility between the partners.
- » Joint research in a range of areas, including sleep, climate change, global public health, and translation resulting in more than 22 research outputs in high impact journals – 14 of which were published in 2014.
- » Applications for collaborative research bids with a value of over one and a half million pounds.

UGPN Research Collaboration Fund

The UGPN Collaborative Research Fund has been an integral part of the UGPN since its inception. The

fund is designed to support research collaboration between UGPN partners and to date the annual fund of US\$180,000 has supported 19 international research projects. In July 2014, five projects were selected for funding, covering a range of topics including research into the effect of emissions, the structure of ferroelectric film, air pollution and modelling the combustion noise spectrum in lead-burn engines.

Global citizens

The Global Graduate Award (GGA) is part of the University's Internationalisation Strategy aiming to encourage student mobility, support students who want to spend their Professional Training year abroad, and enhance student employability in the global marketplace.

The award is open to all students and is free of charge. Students are invited to start a new language, brush-up on a half-forgotten one, or continue with a language they want to keep up in future. Languages available include Arabic, British sign language, Chinese, Korean, English, French, German, Italian, Japanese, Portuguese, Russian and Spanish. In the current year demand for this programme has increased substantially reflecting our students' desire to become global citizens of the future.



Student and staff global opportunities

More than 200 Surrey students study or work abroad every year. Depending on a chosen degree subject, students can spend a semester or full year studying at one of our partner universities – either in another part of Europe with Erasmus funding, or as far afield as New Zealand, Hong Kong, South Korea, the USA, Canada, Australia, Thailand or Singapore. In addition, an international Professional Training placement remains a popular choice for more adventurous students.

During 2013/14 we have expanded our international Summer School student opportunities in collaboration with University of Sao Paulo so that now students can spend time not only in Seoul, South Korea but also at the Ribeirao Preto campus of USP in Brazil.

In 2013/14 staff mobility grants have been very popular with 38 staff either teaching abroad or receiving training at another European institution. Four institutional strategic grants were also awarded to staff from all four faculties to strengthen links with Universities in USA, Canada and Hong Kong.



HEALTH

From nutrition to nursing ethics and from sleep to infectious disease, University of Surrey academics are at the forefront of groundbreaking discoveries and translational research to improve human and animal health. The following stories offer a glimpse into our fascinating work over the past year, and reveal how Surrey research is contributing to secure a safer, healthier world for all.

▶ Discovering the secrets of sleep



Over the past year, the University of Surrey's world-leading sleep and chronobiology research has led to greater understanding of the mysteries of sleep and contributed to numerous television programmes, high impact journals and articles published across the globe.



A Surrey study, published in the journal *PNAS* (*Proceedings of the National Academy of Sciences*), has revealed that altered bedtimes, due to shift work or jet lag, could have a significant impact on health.

The research, funded by the BBSRC (Biotechnology & Biological Sciences Research Council) and conducted in Surrey's Clinical Research Centre, found that during the disruption of sleep timing, there was a six-fold reduction in the number of genes that displayed a circadian rhythm – the clock that regulates the daily cycles of our bodies as we transition from day to night and wakefulness to sleep.

The study also unearthed which genes may be regulated by sleep-wake cycles and which are regulated by central body clocks. This finding provides new clues about sleep's function as separate from the circadian clock.

Professor Derk-Jan Dijk (pictured top left), Associate Dean Research and Enterprise, Professor of Sleep and Physiology, and Director of the Surrey Sleep Research Centre, said, "This research will help us to understand the mechanisms by which shift work leads to negative health outcomes such as breast cancer.

"The results also imply that sleep-wake schedules can be used to influence bodily processes, which may be very relevant for conditions in which circadian rhythmicity is altered, such as in ageing."

Surrey researchers have also discovered that the time of day and sleep deprivation can have a significant

effect on metabolism – information that could be important in interpreting the results of blood tests, and in understanding why some individuals respond differently to medication.

This study, conducted by researchers from the University of Surrey, the Erasmus MC University Medical Centre in Rotterdam and The Institute of Cancer Research in London, also published in the journal *PNAS*, showed that metabolic processes are significantly increased during sleep deprivation. Using metabolomics, a new cutting edge method, 27 metabolites, including serotonin, were found at higher levels in periods of sleep deprivation compared to levels during sleep. The findings provide novel insights into the metabolic processes and pathways linked to sleep/wake processing.

Professor Debra Skene (pictured bottom left), Professor of Neuroendocrinology and lead author of the BBSRC-funded research, said, "Our results show that if we want to develop a diagnostic test for a disease, it is imperative to take the time of day when taking blood samples into account, since this has a significant effect on metabolism.

"This is also key for administering medicines and determining when they will be at their most effective."

Future sleep research at Surrey will investigate the links between metabolism, circadian rhythms and sleep in shift work, diabetes, liver cirrhosis and ageing and focus on the extent by which the rhythms of gene expression are disrupted in various shift work schedules, and how rhythmicity may be restored.



Professor Dijk's pioneering sleep research was the topic of the 2014 Alf Adams Lecture, a prestigious annual event held in honour of the University's Distinguished Emeritus Professor of Physics.

▶ Leading the fight against tuberculosis

Tuberculosis (TB) remains one of the world's most deadly infectious diseases. It kills more than one million people every year and is responsible for huge economic losses in livestock farming.

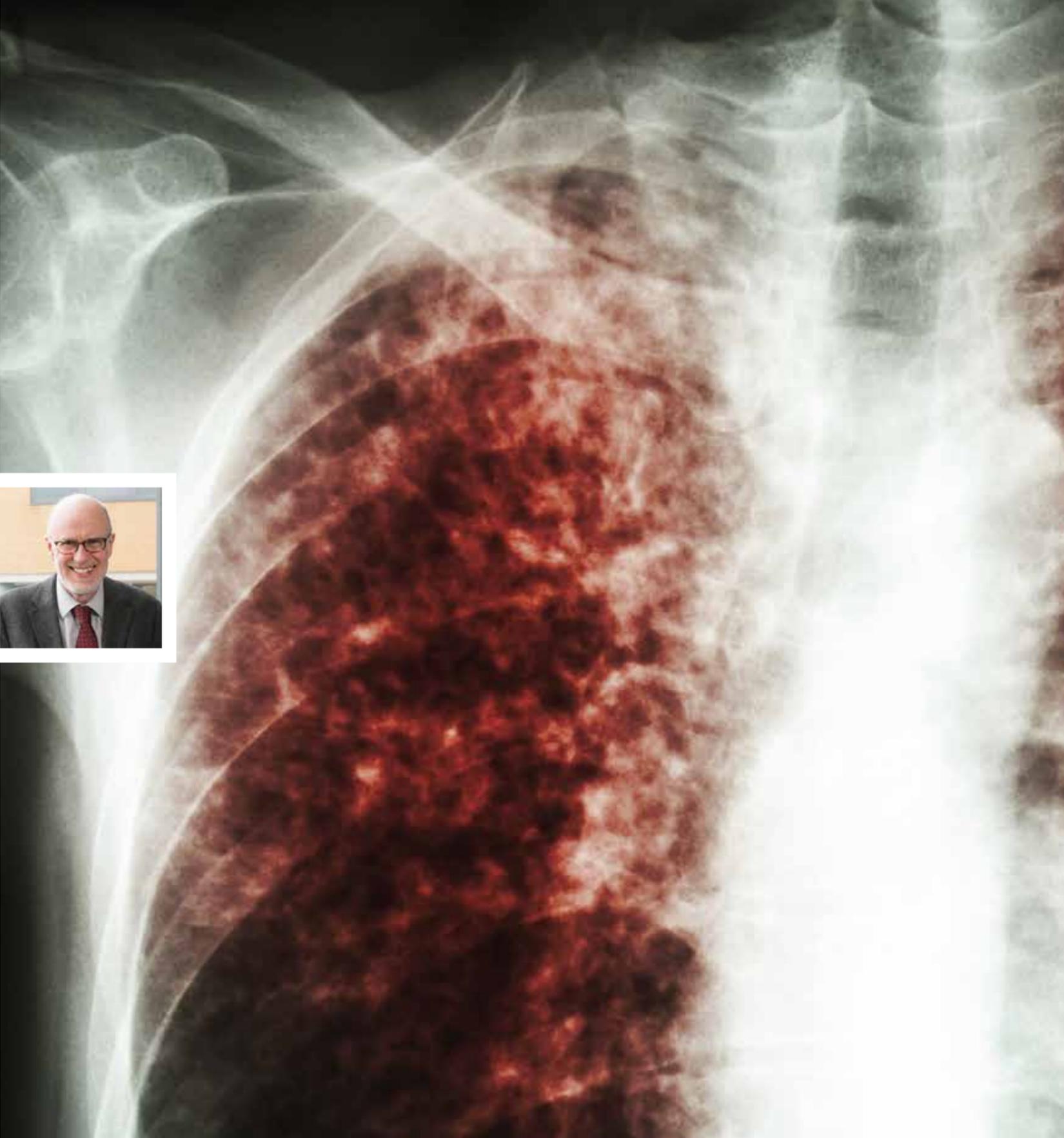
Surrey researchers, led by Johnjoe McFadden, Professor of Molecular Genetics, are working on a number of pioneering projects that could revolutionise the control of TB in both humans and animals.

Funded by £980,000 from the BBSRC (Biotechnology and Biological Sciences Research Council) and the Department of Biotechnology (DBT) in India, a Surrey-led team is collaborating with experts from the Animal Health and Veterinary Laboratories Agency (AHVLA) and the Animal and Plant Health Agency (APHA) in the UK, as well as academics from two Indian institutions, to develop a cheaper diagnostic test for bovine TB and a vaccine that could be used alongside it, for use in India. At the moment, the statutory skin test can give a positive result whether an animal has been vaccinated or is infected with TB.

The team is seeking to delete some of the antigens in the BCG vaccine and replace the existing skin test (which detects all of the antigens TB produces) with one that detects only those eliminated from the new BCG. This means that the test would only show a positive result if cows are infected with the TB bacillus.

Professor McFadden said, "If a suitable new vaccine and diagnostic test can be developed for use in India, it could potentially be transferred to the UK (subject to relevant legislation changes) or even translated for use in humans, avoiding the need for an X-ray to confirm diagnosis following a positive test for TB."

The Surrey team will employ a similar method to tackle the human form of the disease, thanks to significant funding from the Bill & Melinda Gates Foundation.



▶ Unravelling TB's metabolic secrets

Drug resistance is an increasing problem in the fight against tuberculosis. University of Surrey academics are at the forefront of research into new tools to combat the disease.

Our world-leading infectious diseases experts have been awarded a £846,000 BBSRC grant to search for new ways to destroy the bacteria through disrupting or removing its source of 'food'.

Building on previous work that revealed the TB bacterium's metabolism of carbon, the research team, including project leader Professor Johnjoe McFadden, Dr Dany Beste and Professor Andrzej Kierzek, aims to learn more about the bacterium's metabolism of nitrogen.

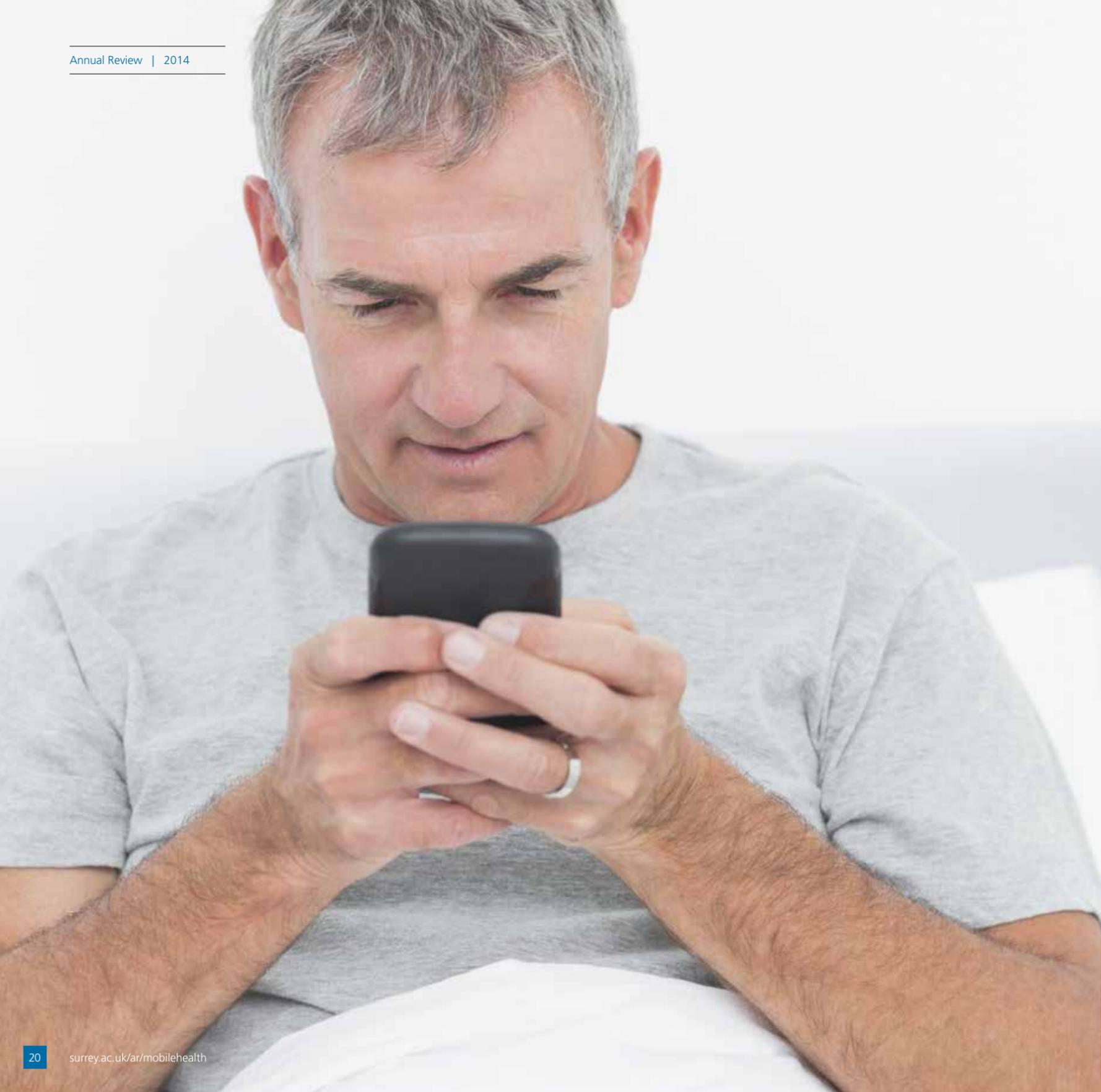
Professor McFadden and his colleagues were the first to develop an *in silico* (computer simulated) metabolic model of the TB bacillus in 2007. The data from the nitrogen study will be added to the model, to provide a more accurate simulation of the metabolism of the TB bacillus than ever before.



The virtual TB cell allows us to conduct in nanoseconds experiments that would take months in the lab. This not only saves time and money – if it helps us to develop effective drug targets, it could help save lives.



Professor Johnjoe McFadden
Professor of Molecular Genetics



▶ Mobile technology in medicine



Chemotherapy is a very effective cancer treatment that has helped save millions of lives, but the side effects can be severe.

The University of Surrey is leading a pioneering project that could transform cancer care – and significantly reduce healthcare costs – by enabling clinicians to remotely monitor patients undergoing chemotherapy treatment, via a mobile phone.

The eSMART (Electronic Symptom Management using Advanced Symptom Management System Remote Technology) project involves giving patients with breast, bowel and haematological cancers a phone with an app-like programme that helps them to identify and record their chemotherapy symptoms daily. This information is sent securely to a computer and triggers an alert to doctors or nurses if the patient requires assistance. The phone also offers patients real-time information and advice on how to manage their symptoms at home.

Researchers, led by Professor Nora Kearney, Professor of Cancer Care and Head of the School of Health Sciences, believe the system will reduce the side effects

of chemotherapy and help to identify and treat life-threatening side effects much quicker than current care systems.

The team has secured a €6 million grant from the European Union that will fund a 1,000-patient European trial, starting early 2015. It is also developing and testing the system for use by people with other types of cancer and other long-term conditions.

Professor Kearney said, “Over three million people are diagnosed with cancer each year in Europe and it is likely that this number will increase by at least 65 per cent over the next 20 years.

“eSMART will give patients continual support both during and after chemotherapy, while allowing them to remain in the comfort of their own homes. It will revolutionise the way our healthcare system supports people with cancer.”



eSMART will give patients continual support both during and after chemotherapy.



Professor Nora Kearney
Professor of Cancer Care
and Head of the School
of Health Sciences



Contributing to better vaccine information across Europe

Surrey academics join continent-wide coalition of organisations to revolutionise benefit/risk assessment of vaccines.

€10m

PIONEERING
PAN-EUROPEAN
ALLIANCE



Experts from the University of Surrey are among those to contribute to the ADVANCE project, a pioneering €10 million pan-European alliance that will provide evidence on the benefits and risks of vaccines more rapidly.

ADVANCE aims to gather the rich information generated in clinical routine care and captured in health care databases and disease registries to cultivate a more comprehensive understanding of the data captured across the continent.



This is vital to benefit/risk evaluations by health care providers, vaccine manufacturers, and public health and regulatory bodies, as well as maintaining public confidence in safe and effective vaccines that prevent devastating diseases.

Surrey's contribution to the project comes through its Clinical Informatics research group. Led by Professors Simon de Lusignan (pictured top), of the Department

of Health Care Management and Policy, and Simon Jones (pictured bottom) of the School of Health Sciences, the group will identify health databases capable of delivering accelerated research about vaccine benefits and risks.

The project is revolutionary in the way it brings together representatives of all stakeholders. Supported by the Innovative Medicines Initiative, it brings together 27 partners – including public health and regulatory bodies at European and national level, vaccine manufacturers, universities, and small and medium-sized enterprises.

ADVANCE is in a unique position to help maintain public confidence in vaccines that protect populations from devastating diseases across Europe.

Immunisation through vaccines prevents between two and three million deaths worldwide each year from diseases such as diphtheria, tetanus, pertussis (whooping cough) and measles.

▶ Conquering Chiari malformation in toy dog breeds

University of Surrey researchers have made major breakthroughs in understanding canine Chiari malformation (CM) – an inherited condition that causes dogs to have brains that are too big for their skulls.

The disorder – which can be described as trying to fit a big foot into a small shoe – affects many toy breeds which have been bred to have attractive baby-like heads, including the Cavalier King Charles spaniel and the Chihuahua. It can cause headaches, problems with walking or even paralysis. Humans can be affected by a similar disease (called CMI) when certain skull bones fuse too early causing the cerebellar tonsils of the brain to descend through an opening in the base of the skull.

Dr Clare Rusbridge (pictured right), Reader in Veterinary Neurology, is leading pioneering research into this complex genetic condition in collaboration with colleagues from the University of Montreal and the University of Georgia.

The research team has identified the specific effect Chiari malformation has on the shape of a dog's skull and brain, and conducted further studies which linked two types of information – phenotypic data (trait measurements) and genotypic data (usually molecular markers) – in an attempt to explain the genetic basis of variation in CM.

A total of 14 quantitative skull, brain and vertebrae measurements were taken from 155 Griffon Bruxellois dogs and tested for association to CM. Six traits were found to be associated to CM and were subjected to a whole-genome association study. This identified two

novel genomic regions that were strongly associated to CM in the dog. Both studies were published in the journal *PLOS ONE*.

Dr Rusbridge said, “One genomic region contains an excellent candidate gene called *Sall-1*. *Sall-1* is involved in development of the skull, and in humans the equivalent gene is mutated in Townes-Brocks syndrome which has previously been associated to CM.

“Our latest discoveries will be significant in driving this research forward. Our next steps will be to apply our technique to other breeds with Chiari malformation such as the Cavalier King Charles spaniel and Chihuahua. We also want to investigate more sensitive ways of screening so that risk of disease can be detected easier, at an earlier age and with a single MRI scan.

“The team is very excited by these findings. Not only may they help dogs and breeders, but they might also help improve understanding of the condition in humans and lead to improved diagnosis and treatment options.”

Following this breakthrough, the University of Surrey has been awarded a grant from the Dogs Trust to repeat this approach in the Cavalier King Charles spaniel breed, with a view to finding a genetic cause for both painful CM and Syringomyelia, a condition that occurs when fluid collects inside the spinal cord.



The team is very excited by these findings. Not only may they help dogs and breeders, but they might also help improve understanding of the condition in humans and lead to improved diagnosis and treatment options.



Dr Clare Rusbridge
Reader in Veterinary Neurology



SCIENCE & TECHNOLOGY

Our industrial collaborations and partnerships ensure our academics lie at the heart of shaping future technologies. Home to award-winning departments and globally-leading research centres, our experienced scientists explore fields such as air travel, forensic analysis, satellite navigation, solar power, ultra-fast lasers, water sanitation and weather forecasting – to name just a few.

► Could elastic bands monitor patients' breathing?

Revolutionary research stretches the limits of current healthcare by enabling medical professionals to measure their patients' breathing, heart rate and movement with graphene elastic bands.

Research published in the journal *ACS Nano* identifies a new type of sensor that could monitor body movement and revolutionise the future of global healthcare.

Although body motion sensors already exist in different forms, they have not been widely used due to their complexity and cost of production. Now, scientists from the University of Surrey and Trinity College Dublin have for the first time treated common elastic bands with graphene, to create a flexible sensor that is sensitive enough for medical application.

Once treated, the rubber bands remain highly pliable. By fusing this material with graphene – which imparts an electromechanical response on movement – the material can be used as a sensor to measure a patient's breathing, heart rate or movement, alerting doctors to any irregularities.

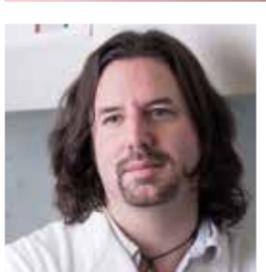
"Until now, no such sensor has been produced that meets these needs," said Surrey's Dr Alan Dalton (pictured). "It sounds like a simple concept, but our graphene-infused rubber bands could really help to revolutionise remote healthcare – and they are very cheap to manufacture."

Corresponding author, Professor Jonathan Coleman from Trinity College Dublin, commented, "This stretchy material senses motion such as breathing, pulse and joint movement and could be used to create lightweight sensor suits for vulnerable patients such as premature babies, making it possible to remotely monitor their subtle movements and alert a doctor to any worrying behaviours."

"These sensors are extraordinarily cheap compared to existing technologies. Each device would probably cost pennies instead of pounds, making it ideal technology for use in developing countries where there are not enough medically trained staff to effectively monitor and treat patients quickly."

Further collaborative research published in the journal *Advanced Functional Materials* suggests that graphene-treated nanowires could soon replace current touchscreen technology, allowing for more affordable, flexible displays and significantly reducing production costs.

The work on graphene touchscreens has gained international coverage including *Forbes*, *The Engineer* and *New Electronics*. Dr Dalton's work on graphene rubber bands also featured on BBC Radio 4's *Inside Science*.



It sounds like a simple concept, but our graphene-infused rubber bands could really help to revolutionise remote healthcare – and they are very cheap to manufacture.



Dr Alan Dalton
University of Surrey

Surrey Centre for Cyber Security launched

The Surrey Centre for Cyber Security (SCCS) brings together core cyber security researchers from the University's Departments of Computing and Electronic Engineering – along with interdisciplinary input from Mathematics, the Surrey Business School, Sociology, Psychology and Law.



The Centre consolidates the wide range of security activity going on in Surrey.

Professor Steve Schneider
Director, Surrey Centre for Cyber Security

Led by Director Professor Steve Schneider, and Deputy Directors Dr Mark Manulis and Dr Shujun Li, the SCCS will focus on issues of privacy, data protection, secure communication and human-centered security.

Professor Schneider said, "The Centre consolidates the wide range of security activity going on in Surrey, with a strong technical core and with emphasis on the associated interdisciplinary aspects – it's the right time to bring it all together."

Visiting Professor Alan Woodward, member of SCCS, who contributed to the European Cybercrime Centre at Europol report, commented, "Cyber security is changing at an extraordinary rate. This year we have passed two important milestones: over one billion active websites, and more people accessing the web using mobile devices over static computers. As storage and computing power increase exponentially along with the speed of networks,

it is inevitable that cyber space will be an integral part of our future. The work of the SCCS is vital if people are to remain safe and secure."

SCCS research projects have been funded by EPSRC (Engineering and Physical Sciences Research Council), EU, TSB (Technology Strategy Board), Home Office, Dstl (Defence Science and Technology Laboratory)/ MOD (Ministry of Defence), industry and other public sector bodies.

The Centre recently welcomed an Applied Security Lab – a 'safe space' for the testing of cyber-attacks – along with the launch of a new GCHQ provisionally certified Masters programme in Information Security. Following a successful year, Surrey's Computer Sciences and IT programmes have also reached ninth place overall within the UK, according to *The Guardian* 2015 league table announcement.

► Servicing spacecraft and clearing space debris

Researchers at Surrey Space Centre build new technology to aid spacecraft repair and disposal of radioactive waste.

Have you ever wondered what happens to satellites when they stop working or come to the end of their life? Researchers at Surrey are developing technology that could help remove space debris and monitor spacecraft.

As the Head of the Surrey Technology for Autonomous systems and Robotics (STAR) Lab within the Surrey Space Centre, Professor Yang Gao and her team are working on a four-year project called 'Reconfigurable Autonomy'.

"Repairing space vehicles and sorting out space debris is challenging, dangerous and costs a lot when you employ humans to do the work," Professor Gao said. "This is why the space industry demands robotic solutions to do this instead. We are creating intelligent robotic systems to inspect, monitor and identify when spacecraft needs repairing. These systems will also have the potential to support astronauts on space missions, and to deal with space debris.

"Our autonomous technology will be deployed in snake-like robots who will perceive their environment through built-in cameras. Our technology could also work on simpler platforms, such as robotic arms, like the type used in car manufacturing factories."

The robot's vision system is based on technology that can recognise objects (shapes, colours and angles) as a human would – so it can learn to detect, track and recognise anomalies of the spacecraft.

"If you had a malfunctioning part on a moving spacecraft, our technology enables space robots to detect these issues, and to potentially fix the problem there and then, without human intervention," she added.

This may make it possible for robots to assist astronauts in the International Space Station – by carrying out hardware checks and testing equipment before important missions. Another



Robotic agents will play a crucial role in future space missions in supporting astronauts.



Professor Yang Gao
Head of Surrey Technology for Autonomous systems and Robotics (STAR) Lab



potential application is within the nuclear industry, identifying decommissioned radioactive waste in nuclear plants – thus saving human operators from radiation exposure.

"I feel robotic agents will play a crucial role in future space missions in supporting astronauts," Professor Gao concluded. "My team is very enthusiastic and excited about new opportunities and applications of the technologies we are developing."

The STAR lab is also working with Chinese scientists to discover more about the moon's surface, extracting data from relevant technologies.

In related news, Professor Underwood currently leads the Surrey side of a collaborative project (formed with the California Institute of Technology) aiming to develop a fully-functional, self-building telescope to further global understanding about the weather conditions, atmosphere and sights within space.



Our new technology could allow surgeons to 'see' inside tissue to find biolabelled tumours prior to surgery as well as equip conventional consumer products, such as cameras and mobile phones, with night imaging options.



Dr Richard Curry
Advanced Technology Institute (ATI)



► New sensor could light the way for low-cost imaging

Research published in Nature's *Scientific Reports* demonstrates a new type of light sensor that could allow medical and security imaging via low cost cameras.

A team of Surrey researchers, led by Dr Richard Curry of the Advanced Technology Institute (ATI), has developed a new 'multispectral' light sensor (pictured) that detects the full spectrum of light, from ultra-violet (UV), to visible and near infrared light.

Near infrared light is already used to perform non-invasive medical monitoring, such as measuring the oxygen level in tissue and detecting tumours.

Their paper, 'Ultrahigh Performance C₆₀ Nanorod Large Area Flexible Photoconductor Devices via Ultralow Organic and Inorganic Photodoping', demonstrates that by introducing an ultralow 'photodoping' mechanism, in addition to conventional detection of visible light, photosensitivity can be extended to the UV and near infrared without compromising performance, opening up a number of new possibilities.

"Until now, high-performance light sensors have

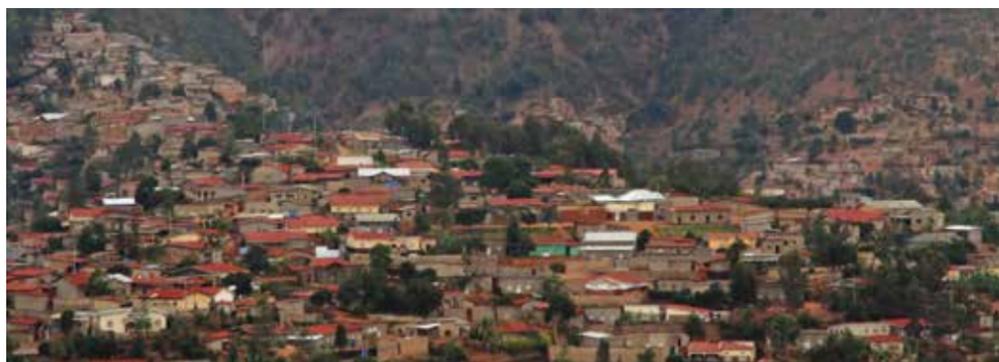
been limited in the spectrum of light they can detect, with multiple sensors required to measure different regions of the light spectrum, significantly increasing cost," said Dr Curry.

"Our new technology could allow surgeons to 'see' inside tissue to find biolabelled tumours prior to surgery as well as equip conventional consumer products, such as cameras and mobile phones, with night imaging options. This is useful for capturing quality pictures in the dark, and may enable parents to monitor a child's blood or tissue oxygenation level via a smartphone camera which could be linked to healthcare professionals."

As well as potentially transforming global healthcare by providing a low-cost method of individual health monitoring, the new flexible 'multispectral' sensors can be produced using the inkjet printing method found in homes and – unlike other sensors – do not require specialised manufacturing conditions.

► Investigating poor water quality in African slums

Project 'Groundwater 2030' unearths the reality behind drinking water in East-African informal settlements.



Kisumu (pictured above), one of the largest cities in Kenya, has a booming population.

Most of this growth is concentrated within peri-urban slum districts which struggle with poor quality sanitation (predominantly due to home-dug pit latrines which can allow pathogens and chemicals to diffuse into nearby hand-dug drinking water wells), and disease.

In light of this, the Government of Kenya published 'Kenya Vision 2030', a development framework outlining key objectives including implementing solid waste management, strengthening physical

and social infrastructure and improving water and sanitation facilities in slums.

University of Surrey academics are now using the Kenya Vision as the backbone to 'Groundwater 2030: sustaining urban groundwater for the poor', a project studying the changing quality of Kisumu's groundwater and assessing its long-term impact on the health of its expanding population.

"We are gathering this information so that, when we combine it with socio-economic data, we have a thorough picture of how the poor are suffering from contaminated water, compared to those from richer areas of

Africa," said Surrey's project co-investigator, Dr Steve Pedley, who is working on the project alongside a consortium of key players from the University of Bristol, University of Southampton, Jaramogi Oginga Odinga University of Science and Technology and the Victoria Institute for Research on Environment and Development (both in Kenya).



Once we know how deep the problem lies, we will be in a position to evaluate a range of water management schemes and hopefully improve people's health and overall quality of life in the future.



Dr Steve Pedley
University of Surrey

Groundwater 2030 is looking to help a range of agencies transform the lives of slum dwellers, and Surrey aims to develop a framework to guide implementation of future sanitation projects around the world.

► Research identifies amino acid's power to fight strokes and heart failure

Collaborative project investigates the regulation of oxidase activation and superoxide production, for the treatment of neurodegenerative and respiratory illness.

The enzyme complex 'NADPH oxidase' is an integral part of the body's plasma membrane, and helps white blood cells fight microorganisms. However, too much reactive oxygen results in oxidative stress and tissue damage – causing strokes, heart failure and neurodegenerative diseases.

Surrey academics, Dr Brendan Howlin and Professor Jian-Mei Li, have discovered that a single amino acid, phosphorylation, can control this enzyme activity.

Their research paper 'Molecular Insights of p47phox Phosphorylation Dynamics in the Regulation of NADPH Oxidase Activation and Superoxide Production', published in *The Journal of Biological Chemistry*, strengthens the argument for the development of novel inhibitors for the treatment of future oxidative stress-related disease.

Dr Howlin said, "The combination of molecular modelling and experimental biology is a powerful tool for modern chemical and biological research – as well as medicine. The molecular insight of the activation mechanism of NADPH oxidase means that Surrey is one step ahead of other scientists in this very competitive research field."



Detail of white blood cell

With help from the University of Surrey Seed Fund, the team is now using computer-aided drug design to model a potential drug binding to the P47phox protein described in the paper. So far, they have synthesised the compound and tested its efficacy successfully in cell and animal models.

University of Surrey first funded the European patent which proved that

new substituted aromatic hydrocarbon compounds are NADPH oxidase 2 inhibitors; these inhibitors are useful for treating cardiovascular, respiratory, neurodegenerative and inflammatory diseases. The University now owns the international patent on the drug designed by the Surrey researchers, using the information from this paper to treat the diseases of ageing.



SOCIETY

From research into wearable electroencephalography (EEG) equipment to lack of accessible tourism and obesity drug failure, our academics are leading the way with their investigations into society. These stories reveal the diversity of our pioneering work and highlight the role our academics play in creating a wider understanding of society.

► Wearable EEG research: whole University becomes a neuroscience laboratory

A new research project from the School of Psychology will put wearable electroencephalography (EEG) equipment through its paces in everyday situations around campus, breaking the reliance on artificially controlled laboratory settings.



An ERASMUS-facilitated collaboration between the University of Surrey's Brain & Behaviour Group and Germany's University of Oldenburg is testing a sophisticated new technique that allows neuroscientists to gather data on real brain behaviour in real time in the real world. They will do this by taking advantage of EEG systems designed specifically to be worn during everyday activity, and the development of specialised software for the analysis of artefact-contaminated data.

experiments are usually asked to remain perfectly still and to concentrate their gaze on one spot. They may even be asked to relax their jaw and neck muscles and to blink only during 'blink holidays' that are built into the experiment.

Much fascinating and vital new knowledge has been acquired under these conditions, but the necessary next step of examining how the brain works in more normal settings has proved extremely difficult.



The evolution of new neuroimaging techniques over the last couple of decades has brought huge advances in understanding of brain structures, functions and processes, but neuroscience has often found it difficult to study natural cognition in the messy environments to be found outside the laboratory.

Following successful initial development work, the project team was awarded research funding from the UK's Defence Science and Technology Laboratory (DSTL) to examine the effect that carrying heavy equipment has on cognitive function. This funding has allowed the recruitment of a PhD candidate to work on the three-stage, four-year project under Professor Annette Sterr (pictured top) and Professor Paul Sauseng (pictured bottom) in Surrey's School of Psychology.

To examine what the brain is doing during a particular physical behaviour or cognitive process, neuroscientists measure specific mental activities through the precise detection of certain signals. But the measurable signals that they want to examine are just one of a huge number that the brain routinely emits as it goes about its complicated business.

Professor Sterr commented: "As well as helping DSTL with its specific knowledge requirements, this project will generate crucial new expertise in research methodology to underpin the next phase in neuroscience: moving out of the lab and into the everyday world."

To try to limit these extraneous bits of information (or 'artefacts'), subjects participating in laboratory



As well as helping DSTL with its specific knowledge requirements, this project will generate crucial new expertise in research methodology to underpin the next phase in neuroscience: moving out of the lab and into the everyday world.



Professor Annette Sterr
Professor of Cognitive Neuroscience
and Neuropsychology

► Can narcissists feel empathy?

A research breakthrough from the University of Surrey suggests that narcissists possess the physical capacity to empathise with someone else's distress.

Psychological interventions to raise empathy levels in people with narcissistic tendencies could be on the way following new research suggesting that narcissists are physically capable of empathising with other people's distress. The research by Dr Erica Hepper and colleagues was published in *Personality and Social Psychology Bulletin* and shared extensively across academic and non-academic circles.

Empathy is important as a 'glue' that helps personal relationships and social bonds to develop, form and endure. If (as the research suggests) narcissists possess the physical capacity to feel empathy, it gives psychologists a foothold on which to base measures to help these people empathise more.



When we asked narcissists to imagine a situation from another person's point of view, they actually processed that situation using the same parts of the brain that they use to process their own experiences.



Dr Erica Hepper
University of Surrey

This is important, as narcissists tend to use more than their fair share of resources, are more prone to aggressive or anti-social behaviour, and are more likely to commit crimes and go to prison. Other studies suggest that narcissism has been increasing across different cultures for the past three decades, with younger people more likely to exhibit narcissism than older generations.

"Our findings are promising in suggesting that even relatively anti-social members of society can be empathic," commented Dr Hepper. "This is not only good for the people around them, but also good for their own wellbeing in the long-run."



► Psychology research sheds light on reasons for obesity-drug failure

New study suggests that a lack of information about the anti-obesity drug orlistat's side effects may be one of the reasons why some people actually gain weight after being prescribed the medication.



Our results have significant implications for GPs and how they should communicate with patients about this drug.



Dr Amelia Hollywood
School of Psychology



Some patients who gain weight after being prescribed the anti-obesity drug orlistat attribute their weight-loss failure to unpleasant side effects that caused them to stop taking the medication, according to a University of Surrey paper published in the *Journal of Health Psychology*.

This finding is important as the side effects in question occur when the individual consumes fatty food, suggesting that the fundamental changes to diet, attitude and lifestyle required for sustainable weight loss have not been adopted. Participants also reported other medical, psychological, social and personal circumstances as barriers to weight loss, which could be overcome through better education, counselling and support to understand and address the reasons for their obesity.

"Our results have significant implications for GPs and how they should communicate with patients about this drug," said lead author Dr Amelia Hollywood from the School of Psychology. "By alerting patients to these consequences and emphasising the need for dietary change, patients may be in a better position to make an informed judgement as to whether they wish to take this medication."

"Doctors may likewise be able to make a more informed decision as to whether the medication should be prescribed, with potential savings for the NHS through reducing the waste of medications."

► Lack of accessible tourism costing economy billions

Study discovers that the tourism industry across Europe is missing out on up to €142 billion annually.



Researchers at the University of Surrey have revealed that the European tourism sector is losing out on as much as €142 billion every year due to poor infrastructure, services and attitudes towards travellers with special access needs.

The research project, which was funded by the European Commission, discovered that travellers within the EU who required special access (whether through disability or age) undertook 783 million trips within the region in 2012, contributing €394 billion and 8.7 million jobs to the European economy.

However, if European destinations were fully accessible, this demand could increase by up to 44 per cent a year – producing an additional €142 billion GDP and creating 3.4 million jobs.

The research, which was carried out by Dr Victoria Eichhorn, Dr Gang Li, Professor Graham Miller and Dr Jason Chen (pictured from left to right) from the University's School of Hospitality and Tourism Management, is the first of its kind to study the economic impact of accessible tourism within Europe.

Following the research, the European Commission identified several key recommendations for improving accessibility in its report, 'Economic impact and travel patterns of accessible tourism in Europe'.

"This is a golden opportunity for the European travel sector", explained Professor Miller, who spoke to Radio 4's You & Yours programme about the research. "The worry of many businesses has been recouping the cost of adapting for special access needs. This research shows that this cost will not only be recovered, but will result in market growth."



The worry of many businesses has been recouping the cost of adapting for special access needs. This research shows that this cost will not only be recovered, but will result in market growth.



Professor Graham Miller
Head of the School of Hospitality and Tourism Management

▶ Politicians must be tougher to meet transport emissions targets

Research discovers that a focus on new technology is not enough to reach carbon reduction targets in the transport industry.

Transport accounts for 30 per cent of carbon dioxide emissions in the EU, with emissions rising 36 per cent between 1990 and 2007. In order to drive decarbonisation policy and lower these numbers to meet reduction targets for carbon emissions, policy-makers are turning to new technologies in the transport industry, such as biofuel and improved aircraft design.

However, researchers at Lund University in Sweden and the University of Surrey have revealed that politicians need to address deep-seated 'transport taboos' rather than simply focus on technological innovation.

The paper, 'Why sustainable transport policies will fail: EU climate policy in the light of transport taboos', exposes a range of transport 'norms' that need to be addressed before real progress can be made, finding that it is often the most highly mobile and environmentally aware travellers who refuse to change their ways.



There is a lot of exaggeration surrounding 'wonder' technologies that promise to reduce carbon levels while allowing privileged sections of society to continue to travel without limits.



Dr Scott Cohen

School of Hospitality and Tourism Management

The paper was widely syndicated across a range of news sites, including The Conversation, Climate Wire and Responding to Climate Change.

"The richest and most politically powerful contribute the most to global carbon emissions", noted Dr Scott Cohen from the School of Hospitality and Tourism Management, who co-authored the paper. "There is a lot of exaggeration surrounding 'wonder' technologies that promise to reduce carbon levels while allowing privileged sections of society to continue to travel without limits."

"Politicians continue to ignore evidence of what works in favour of optimistic headlines about technological innovation, driven by industry and lobbyists. Rather than maintain the status quo, we need to start challenging these damaging norms."





SURREY MEANS BUSINESS

In 2014, there was a significant increase in Surrey's business activity. Here we review the development of the University's 5G Innovation Centre and the achievements of Surrey Research Park. We celebrate the success of Surrey Incubation and Surrey Business School.

Aerial view of Surrey Research Park (left-hand page)

Research and Enterprise Support

Keith Robson, Chief Operating Officer for the Surrey 5G Innovation Centre, offers his 2014 review



The University worked closely throughout the year with the Enterprise M3 (EM3) Local Enterprise Partnership (LEP) in the development of their regional growth strategy. The UK Government is placing much emphasis on the regional LEPs to help drive the UK's future prosperity. We were therefore delighted when in July 2013 the Rt Hon Greg Clark MP, Minister of State for Cabinet Office (Cities and Constitution) and newly appointed Minister of State for Universities and Science, signed EM3's £118 million Growth Deal, the first to be signed off in the UK. The deal includes £5m to support Surrey's 5GIC and Innovation Gateway in generating additional activity to support local businesses. EM3 is also supporting exciting plans to connect Surrey's new School of Veterinary Medicine and Surrey Research Park with other regional public sector research establishments to develop a world class enterprise cluster of activity in animal health.

In October 2013, the University signed a contract with the eleven industry partners supporting the establishment of the University's 5G Innovation Centre (5GIC) which aims to develop the fifth generation (5G) mobile communications network capable of handling future mobile, broadband, terrestrial TV and digital growth and supporting emerging technologies such as the Internet of Things, Machine Type Communications and Big Data. The 5GIC, combined with the University's Innovation Gateway programme for the connected digital economy, has now attracted £58 million in partner funding in addition to the original £11.6 million support from HEFCE. This will enable the University to establish one of the world's foremost centres in this sector. The outside organisations will work in close

collaboration with the Centre to develop innovative solutions and standards for 5G networks.

The Centre will also be an international hub for research and innovation, providing significant opportunities for UK economic growth. It will include large-scale experimental facilities and specialist laboratories for network testing, as well as a unique test bed to prototype 5G equipment and services.

Due to open in 2015, the 5GIC is located on the University's Stag Hill campus and will be home to over 150 researchers and 100 PhD students.

2013/14 also saw a further significant increase in Surrey's business incubation activity, with funding for new ventures raised from the Surrey 100 Business Angel Club now in excess of £25 million. Surrey continues to retain its place as one of the top performing universities in the UK in terms of provision of such start-up finance, with only Cambridge, Oxford and Imperial raising larger amounts.



5GIC is in a unique position to deliver next-generation communications through close collaboration with telecommunication world-leaders.



Professor Rahim Tafazolli
Head of the Institute for Communication Systems (ICS)

£11.6 million

5G GRANT FROM HEFCE FROM ITS UK RESEARCH PARTNERSHIP INFRASTRUCTURE FUND (UKRPIF)

£58 million

ADDITIONAL FUNDING FROM 5G PARTNERS INCLUDING SOME OF THE WORLD'S LARGEST TECHNOLOGY COMPANIES



From left to right: Professor Rahim Tafazolli, Head of the Institute for Communication Systems, The Rt Hon David Willetts, MP, Professor Sir Christopher Snowden, President and Vice-Chancellor, David Hendon, Chair of the 5G Industry Strategy Advisory Board



Surrey Research Park

Q & A with Dr Malcolm Parry, Director of Surrey Research Park.

Who owns Surrey Research Park and when was it launched?

The Surrey Research Park is owned, funded and developed by the University of Surrey. The idea was first promoted in 1979, as a way to extend the University's long-standing policy of working closely with industry.

It has been developed over the last 29 years by the University to support companies involved in the commercialisation of a wide range of sciences, including social science, technologies, health related activities and engineering. The 70 acre site offers highly congenial surroundings combining attractive architecture with beautifully landscaped areas and lakes.

The University has extensive research contracts and links with industry and the Surrey Research Park was originally promoted to extend this important policy of cooperation with industry.

How many companies are located on Surrey Research Park?

The Surrey Research Park currently houses over 110 companies engaged in work of which some is pushing forward the frontiers of science, engineering and technology while other aspects are associated with innovation which is the successful commercialisation of these ideas.

110

COMPANIES CURRENTLY HOUSED AT SURREY RESEARCH PARK

4,000

NUMBER OF JOBS CREATED IN THE LOCAL AREA

Surrey Technology Centre,
Surrey Research Park



Surrey Technology Centre, Surrey Research Park

£1.4bn

ECONOMIC
IMPACT

What has the park contributed to the local economy?

First, there is the direct employment by the Park's tenants. Secondly, there is the indirect employment through purchasing goods and services as a consequence of their activity. Finally, there is induced employment resulting from consumption by those directly and indirectly employed.

In 2014, Park tenants employ around 3,500 people on site, some of whom are recruited from within Surrey and others are from the pool of highly qualified graduates and postgraduates from our own courses. An estimated 4,000 jobs have been created in the area as a result of the companies that have grown up on the site and graduated to take other space locally.

The Surrey Research Park has been praised for its increasingly important role in the regional economy

as the commercialisation of science and technology become core elements of any future competitive economy and in an in-depth review by the UK Science Park Association (UKSPA). The report has revealed that the companies on Surrey Research Park contribute between £580 and £625 million of economic activity to the regional economy each year.

This has been endorsed with a recent figure from a wider study of the contribution of the Park's host University of £1.4 billion Gross Value Added (GVA) annually of which the Park in 2012 contributed £450 million of this addition to the economy.

What have been the greatest achievements on Surrey Research Park?

By the end of 1996, the Park had contributed over £20 million to University finances through direct donations



Stefan Peter and Kyra Archibald at Surrey Research Park company Angle Parsortix plc

£92m+

CONTRIBUTED
TO UNIVERSITY
FINANCES BY ITS
RESEARCH PARK

to support specific research projects and existing activities. Today, the contributions from the estate alone stand at £92 million to which can be added the significant and growing contributions from research and other collaborative activities.

In addition, significant income comes through tenants purchasing University services, such as audio-visual services, conference facilities and the use of the Library to help fund these activities. Moreover, the close and continuing relationships between University staff and Park businesses have resulted in consultancy and collaborative research projects that generate on-going revenue streams for the University.

With its market valuation at over £91 million, the Park adds further to the security of the University and provides access to further funds by supporting the

borrowing for major capital projects on the University's campus. As the estate approaches full development the Park will continue to be a significant element of the University's asset portfolio, raising the profile of the University, supporting knowledge transfer and both helping companies maintain a competitive advantage while meeting the aspiration of the Borough for developing a more diversified economic base. The Park has also enabled and supported a number of 'spin out' companies.

The Surrey Research Park has been recognised as 'fundamental to the region's economy and growth' and one of the best Science Parks of its kind in the UK by Science Park Movement Founders UKSPA in its first ASPIRE review and for which it received an award from UKSPA at its 30th anniversary celebration of offering the most successful innovation among the 70 Parks in the UK.

Surrey Incubation

Sarah De'Lacy, Head of Incubation and Director of Surrey 100, celebrates the growth of Surrey Incubation.



Surrey Incubation – the background

The University has been incubating technology businesses since 2002, when along with Bath, Bristol and Southampton Universities we founded the SETSquared Partnership. SETSquared has directly supported over 650 companies since 2002, helping them raise over £0.75 billion and creating over 1,000 new jobs. It has also been ranked by the University Business Incubator Index (UBI) as number one Incubator in Europe and second in the World 2014.

Since then, Surrey Incubation has founded its own Angel Investment Club, the Surrey 100 Club (2007), and launched a Space Incubator (2011).

Incubation 2014 successes

Surrey Incubation is currently supporting 65+ high-growth technology and space related businesses.

Below we showcase three of those businesses:

iGeolise has been a member of the incubator since 2009. They now have a team of 12 people and offices on the Research Park, Guildford and London. Their technology, The Travel Time Platform allows the searching of maps by time, instead of distance. In 2014, Countrywide Plc, the UK's largest integrated property service group and

now one of iGeolise's customers, released a study that demonstrated a 300 per cent increase in Propertywide conversions from using The Travel Time Platform and have secured iGeolise as a supplier for this technology going forward. iGeolise's customers now span recruitment, retail, travel, ticketing, entertainment, business analytics and more, as well as plans to expand internationally.

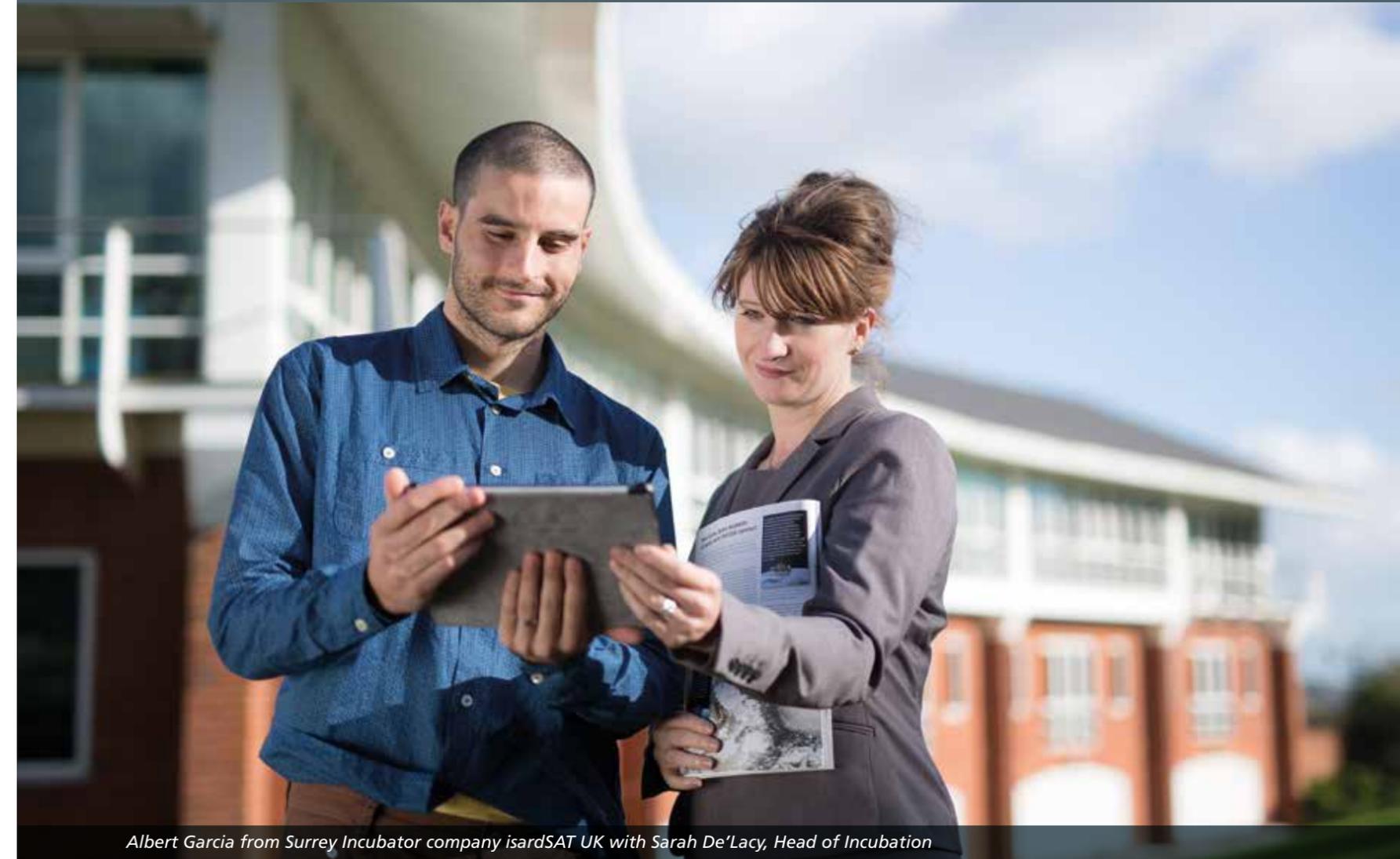
In April 2014, **TorqBak**, a member since 2011, secured £150,000 investment from Mercia Fund Management to help grow their Twitter business.

isardSAT, a member of our space themed incubator since 2013, has been awarded their first contract with the European Space Agency (ESA) for the CryoVal-LI project. The CryoVal-LI project objective is to address the error budgets for land ice, making use of extensive in-situ, airborne and satellite datasets acquired in multi-year land ice regions north of Greenland and Canada, complemented by seasonal ice datasets acquired near Svalbard.

Surrey Incubation is currently supporting 65+ start-ups and has helped businesses raise £111,994 million in grants and equity investment, with over 705 jobs protected and created.

65+

BUSINESSES
SUPPORTED



Albert Garcia from Surrey Incubator company isardSAT UK with Sarah De'Lacy, Head of Incubation

Surrey 100 success in 2014

The Surrey 100 Club is the South East's leading Angel Investment Network, whose President is Michael Queen, formerly Chief Executive of 3i Group plc. The Surrey 100 Club has a track record in helping businesses, securing over £25 million in funding from Surrey 100 Angels, other Angel Clubs and matched Grant funding, which has assisted in protecting and creating over 360 jobs.

In 2014, the Club has seen over 26 high-growth businesses across the UK present to their Members, with over 50 per cent being offered investment. This year also saw our first Inaugural London event at the prestigious offices of Orrick, Cheapside, London, where eight businesses presented to the Surrey and London community of investors.

£25m+

FUNDING
SECURED

Surrey Business School

David Goss, Head of Surrey Business School and Professor of Entrepreneurship, reflects on success in 2014 and the future.



Surrey Business School provides opportunities to engage with businesses both in our Professional Training placements and in our programmes, supplemented by the involvement of exceptional entrepreneurs and business leaders who support us across our activities.

Our pioneering Professional Training programme enables our students to undertake high quality paid work experience placements giving them the opportunity to demonstrate their talents to employers. The University has established strong connections with more than 2,300 placement partners involved in providing placements over the last five years.

The success of our Professional Training programme has underpinned our record as one of the leading UK universities for graduate employment with 97 per cent of our graduates in employment six months after leaving us – the highest level in English universities.

Our business and management programmes this year entered the top ten in the UK for student satisfaction in the National Student Survey and 98 per cent of our graduates were in work or further education six months after they graduated.

Over the past year, Surrey Business School has leapt up the national league tables. Our business and management programmes are ranked 15th out of 120 in the UK by *The Good University Guide* and *The Guardian University Guide*, while our Accounting and Finance programme is ranked seventh and tenth in the tables respectively.

The School is home to an exciting new team who are developing innovative solutions to the digital economy, with experts in innovation and digital applications working with corporations and SMEs to address issues of agile innovation, big data and new platforms and business models. This work supplements our other research strengths in organizational psychology, retail management, banking and finance and sustainability.

Surrey Business School encourages students to be entrepreneurial and innovative, supported by exceptional academics, many of whom have considerable business experience. This focus on engagement with businesses, SMEs and national policy-makers will be a key feature of our strategic development.

2,300
PARTNER
ORGANISATIONS





PEOPLE

Surrey's students are supported by world-leading academics who inspire them to fulfil their ambitions. Many of our students embark on the renowned Professional Training programme before completing their degrees and entering the world of work or further studies. Here we showcase our students, award-winning academics and successful alumni who are all part of the Surrey family.

» The student experience

Providing a high-quality student experience lies at the very heart of the University.

National Student Survey success

The University of Surrey has been ranked fourth for Student Satisfaction in *The Times/Sunday Times Good University Guide 2015*.

The fourth position is an average based on the University's performance in seven key areas of the National Student Survey (NSS): Teaching; Assessment & Feedback; Academic Support; Organisation & Management; Learning Resources; Personal Development and Overall Satisfaction.

In the 2014 NSS, the University was ranked eighth out of 135 institutions achieving an overall satisfaction rating of 91 per cent.

Surrey's score increased in five of the seven key areas of the survey compared to last year, including the highest percentage that Surrey has achieved in Assessment and Feedback plus gains in Learning Resources and Academic Support. Subjects at Surrey including Management, Law, Electronic and Electrical Engineering and Drama achieved over 90 per cent satisfaction, with Politics and Psychology achieving 97 per cent.

Satisfaction with the Students' Union has increased steadily over the past two years due to the Union's commitment to having a positive impact on every Surrey student. The Union has recently moved up one place from thirteenth to twelfth nationally and this is a reflection of the work being put into improving the experience provided by the Union for all students.

"We are pleased to see that students still rate their experience at Surrey very highly. Providing a high-

quality student experience is at the very heart of the University and we continuously strive to ensure that every student gets the most out of their time here," said Professor Gill Nicholls, Vice-President and Deputy Vice-Chancellor Academic Affairs at the University of Surrey.

President of the Students' Union, Maz Hussien, added, "The NSS results are taken seriously by students. The University's new code of practice for assessment sets out the University's priorities in this area, and it is a document used constantly by the Students' Union. Parallel to this, each faculty must produce an NSS action plan which sets out improvements that must be made."



I'd say that Surrey's high position in the league tables convinced me that this would be a brilliant first option to apply for.



Isabella Cordani
Student

Surrey in the league tables

The NSS has helped to improve the student experience and the consequence is that Surrey has risen up the league tables including a leap to sixth in *The Guardian University Guide 2015*. Surrey achieved eleventh place in *The Times/Sunday Times Good University Guide 2015* and moved up in *The Complete University Guide* to twelfth in the country.



Isabella Cordani, Research Assistant, Surrey Baby Lab, and Ellen Pugh, placement student

97 per cent graduate employability

In 2014, new figures from the Higher Education Statistics Agency (HESA) revealed that 97 per cent of Surrey's 2013 graduates were in work (or further education) six months after they graduated – up 4.2 per cent from the previous year.

Students' Union Vice-President for Education, Matt Sadlers, highlighted the importance of both league table positions and graduate

employability statistics to students. He said, "League tables and graduate employability will, of course, have an impact on student decision making. For example, these figures may influence which institutions make it to a prospective student's list of preferences. Students will look at the ranking of their chosen course, entry standards expected, and use the prospectus and online materials to establish whether the University offers them everything they expect."

Isabella Cordani, student, added, "From a student point of view, I'd say that Surrey's high position in the league tables convinced me that this would be a brilliant first option to apply for, and the fact that we carry on rising makes me proud to go here. Looking at the high employability of Surrey graduates was very reassuring and further strengthened my decision to apply here."



The University of Surrey
Students' Union

THE FIRST YEAR — NEW WAYS OF LEARNING



Jennifer Jacobsen
BSc (Hons) Business and Retail Management

I came to the University of Surrey from Helsinki in Finland, after completing the International Baccalaureate.

The teaching and learning culture at Surrey has given me a deeper interest in my field of study – and my course has made me far more analytical of the current environment and my surroundings. Meeting and working with people from different backgrounds,

cultures and university courses has made me much more curious about the world.

Surrey encourages students to be the best they can be, both academically and socially, and they offer you countless opportunities to help you develop yourself professionally (careers service, talks and fairs, company visits, placements and so on) as well as personally, and will actively support you every step of the way.



Surrey encourages students to be the best they can be.



Jennifer Jacobsen
BSc (Hons) Business and Retail Management



All of the academics provide a solid support system.



Ashleigh Thompson
BSc (Hons) Biomedical Science

THE SECOND YEAR — STUDYING HARD & PREPARING FOR A PLACEMENT



Ashleigh Thompson
BSc (Hons) Biomedical Science

I chose the University of Surrey because it's one of the best in the UK for bioscience degrees.

Working with my tutors has been fantastic – and having a personal tutor with such a passion for their subject has helped me to stay focused. All of the academics provide a solid support system – I've had lots of help from them since I started here,

especially in terms of time management, and they've given me plenty of feedback and advice on my work.

Being taught by lecturers who are well known in their fields is a major plus point too, and I've really enjoyed the practical work. Meeting so many different people has been a life-changing experience.

» THE THIRD YEAR — PROFESSIONAL PLACEMENT



Daniel Littman
BSc (Hons) Business Management and Spanish

My three years at Surrey have really opened my eyes to different aspects of the world – I feel driven to explore it even more.

During my third-year placement, I worked as the Marketing and Media Manager for the Hilton Buenavista Toldeo in Spain. I secured the job with help from my tutors, who arranged an interview with the company, helped me to write my CV in

Spanish and offered me mock interviews so I could practise. The best thing about my placement was the improvement in my Spanish.

The teaching at Surrey is excellent and has changed the way I think about and approach things. I had never studied Spanish before coming here but in the space of three years I can speak it fluently, which is a real credit to the dedication of my tutors.



The best thing about my placement was the improvement in my Spanish.



Daniel Littman
BSc (Hons) Business Management and Spanish

» THE FINAL YEAR — PULLING KNOWLEDGE & EXPERIENCE TOGETHER



Studying at Surrey has set me up for a great career.



Sam Williams
BSc (Hons) Electronic Engineering



Sam Williams
BSc (Hons) Electronic Engineering

During my four years at Surrey, I found the culture of encouraging innovation amongst students to be really strong.

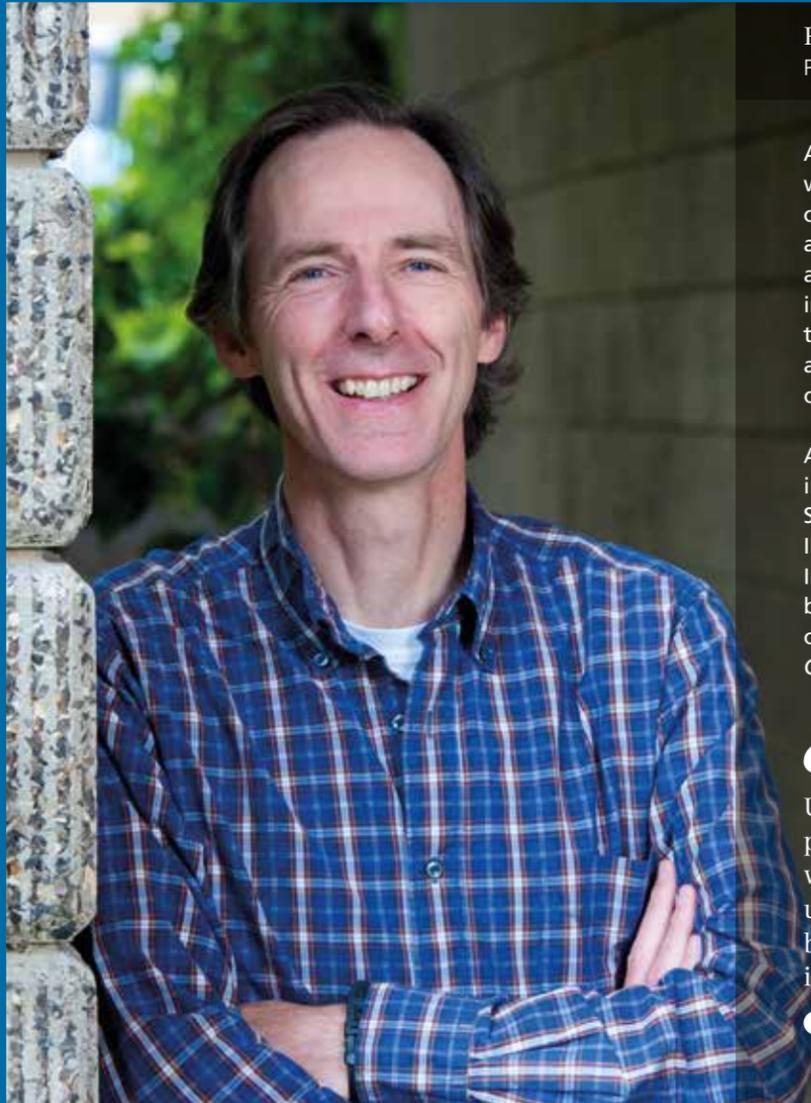
For my final-year project, I decided to create a mobile app for the University, including features I would have found useful as a student. I worked with tutors who were also passionate about mobile app technology, and discussed my ideas with them. They

gave me really valuable input, and collaborating with them throughout the project was incredibly helpful.

The academic staff and the teaching environment at Surrey introduced me to new ways of thinking during my time there. Choosing to study at Surrey was a life-changing decision for me, and has set me up for a great career.

▶ Inspiring academics

The University of Surrey attracts leading academics from around the world acknowledged as experts in their own fields. Here is just a small selection of our talented staff.



Professor Alan W. Brown
Professor of Entrepreneurship and Innovation, Surrey Business School

Alan W. Brown is a software engineer and business strategist who studies how agile delivery practices can help organisations create better solutions faster. He is Professor of Entrepreneurship and Innovation in the Surrey Business School where he leads activities in the area of corporate entrepreneurship and open innovation models. He has been instrumental in launching the Surrey Centre for the Digital Economy (CoDE), a research activity focused on exploring the impact of digital technology on business, the economy, and society.

Alan has extensive industry experience in a variety of areas, including leading business development in a Silicon Valley Start-up, a product strategist and Distinguished Engineer at IBM, and a research scientist at the Software Engineering Institute at Carnegie Mellon University. His latest co-authored book addressing the challenges faced by public sector organizations adapting to the digital economy, *Digitizing Government*, is published by Palgrave MacMillan.



Universities have a strong focus on academic research, pushing forward our understanding of how the world works. The exciting opportunity at Surrey is how we use that knowledge to deliver significant impact on business and society within the rapid speed of change in the digital era.



Professor Nora Kearney
Professor of Nursing and Cancer Care, Head of the School of Health Sciences

Professor Nora Kearney came to Surrey in January 2014 from the School of Nursing and Midwifery at the University of Dundee, where she was Professor of Cancer Care and Dean of Research, and the Cancer Research UK Dundee Cancer Centre where she was Honorary Clinical Professor and led research in cancer care.

Professor Kearney leads and collaborates on a number of multi-centre research projects in the areas of patient experience and symptom improvement, and is a pioneer in the innovative use of technology to provide care to people with cancer. She is leading the EU-funded eSMART trial to remotely monitor patients undergoing chemotherapy treatment via a mobile phone.

"I am delighted to be part of the excellent team within the School of Health Sciences. Our vision is to deliver the most dynamic, effective and caring healthcare professionals from a school that places innovation, research and passion at the heart of everything we do."



Our vision is to deliver the most dynamic, effective and caring healthcare professionals from a school that places innovation, research and passion at the heart of everything we do.





Professor Rachel Brooks

Professor of Sociology, Head of the School of Social Sciences

Professor Rachel Brooks joined the Department of Sociology in May 2012 having previously worked for Brunel University, the University of Southampton and the Open University. She is co-editor of Sociological Research Online, and executive editor of the British Journal of Sociology of Education. Her research interests lie primarily in the sociology of education. Her recent work has focused on the internationalisation of education – exploring the international mobility of students for higher education, and the international activities of UK schools. She has also conducted research on the changing nature of student leadership and its impact on the student experience. She published a report on this in 2014, which was featured in *The Guardian*.

“I have found the University of Surrey a great place in which to both teach and conduct research. Since I joined the Department of Sociology in 2012, I have taught many extremely motivated students, and developed some very productive research collaborations.”



I have found the University of Surrey a great place in which to both teach and conduct research. Since I joined the Department of Sociology in 2012, I have taught many extremely motivated students, and developed some very productive research collaborations.



Professor Chris Proudman

Head of the School of Veterinary Medicine

Professor Chris Proudman has more than 20 years' experience as an equine clinician, teacher and researcher. His research achievements include the development of a diagnostic test for an equine intestinal parasite and studies to elucidate risk factors for different types of intestinal disease. He has received funding from veterinary charitable trusts and the Egyptian government, and is a member of the Veterinary Advisory Committee of the Horserace Betting Levy Board.

Professor Proudman has overseen the development of the School of Veterinary Medicine which welcomed its first cohort of BVMSci Veterinary Medicine & Science students in autumn 2014.

“The School of Veterinary Medicine is a terrifically exciting and inspiring place to work and study. We have an innovative curriculum, purpose-designed buildings, talented and motivated staff recruited from around the world and we are starting to win research funding. I have been delighted by the level of engagement and enthusiasm shown by our first students.”



We have an innovative curriculum, purpose-designed buildings, talented and motivated staff recruited from around the world and we are starting to win research funding. I have been delighted by the level of engagement and enthusiasm shown by our first students.



Our alumni

Our alumni make a valuable contribution to the arts, society, international research and industry. They include leaders in all fields, from entrepreneurs to policymakers to CEOs and Oscar award winners. Here we profile three of our successful alumni.

Chris Benstead
BMus, 2004

Chris graduated from the highly-regarded Music and Sound Recording (Tonmeister) course and has since achieved considerable success in the film industry. He won an Oscar at this year's Academy Awards for his role as music editor and sound re-recording mixer for *Gravity*, along with the BAFTA for best sound. Chris has collaborated with some of the best-known directors, including Sir Ridley Scott, Paul Greengrass and Sir Kenneth Branagh. He has also worked on movies such as *Black Swan*, *Rise Of The Planet Of The Apes* and *Thor*.



Alison Palin
BSc Hotel and Catering Management, 1984

Alison has enjoyed a successful 30 years in the hospitality industry and was appointed General Manager of the Waldorf Hilton in London last year. She started her career at Trust House Forte Hotels as front-of-house manager, before joining Ladbroke Wembley Plaza, which then became part of the Hilton group. Since then Alison has worked across numerous Hilton hotels culminating in being General Manager of Hilton Montreal Airport, Hilton London Kensington and Hilton Paris Charles de Gaulle Airport.



Mohan Maheswaran
BSc Electronic & Electrical Engineering, 1985

After graduating, Mohan worked as design engineer with STC and spent the next eight years with different companies, including Hewlett Packard and Texas Instruments with whom he transferred to their Dallas office in 1994. He is now President and CEO of Semtech Corporation, a leading supplier of high-quality analog and mixed-signal semiconductor products, which has 31 offices worldwide in 14 different countries.



Celebrating success



Professor Jim Al-Khalili
RISE Award

The RISE awards celebrate pioneering academics who are innovators in engineering and science research.

Professor Jim Al-Khalili was named one of the ten RISE (Recognising Inspirational Scientists and Engineers) leaders for 2014 by the Engineering and Physical Sciences Research Council (EPSRC). The RISE awards honour some of the best scientists and engineers, both as established leaders in their field and as future leaders in emerging fields.



To be named as one of ten leading UK scientists and engineers is a tremendous honour.



Professor Jim Al-Khalili



Professor Ravi Silva
J J Thomson Achievement Medal

Director of the Advanced Technology Institute, (ATI) Professor Ravi Silva, has received the Institution of Engineering and Technology (IET) 2014 J J Thomson Achievement Medal for his contributions to electronics.

Professor Silva, working within Surrey's Department of Electronic Engineering, was awarded one of four annual Prestige IET awards from one of the world's largest engineering institutions.



Being awarded the J J Thomson Medal is an amazing privilege.



Professor Ravi Silva



Professor Alf Adams
Rank Prize

Professor Alf Adams was awarded the Rank Prize for his research into the structure of semiconductor lasers by The Rank Prize Funds, a charitable organisation celebrating innovators in the fields of nutrition and optoelectronics.

Professor Adams proposed in 1986 that the electronic band structure of semiconductor quantum well lasers could be significantly improved by deliberately growing the active region in a state of strain.

The infrared laser diode is at the core of CD and DVD technology, fast broadband and supermarket checkout scanners. This was voted the fifth most important UK scientific discovery of all time.

» Honorary graduates

This year, the University honoured some of its alumni, notable individuals and key figures who have made a significant contribution within their field and to society.



Dame Penelope Keith, Pro-Chancellor, Professor Dame Sally Davies and Professor Sir Christopher Snowden, President and Vice-Chancellor

Professor Dame Sally Davies

The Chief Medical Officer for England, who holds responsibility for Research and Development, and is the Chief Scientific Adviser for the Department of Health.

Dr Ann Prentice

Director of the Medical Research Council's Human Nutrition Research in Cambridge, one of the leading Research Institutes on Human Nutrition worldwide.

Mr Geoff Leone

The International Committee of the Red Cross Head of Mission for the UK. He established the first ever relief operations in rebel held areas of southern Sudan.

Mr Neil Chapman

President of ExxonMobil's worldwide chemical business, based in Houston, Texas, with whom Neil has had a 30-year career.

Sir William Wells

Renowned for excelling in many roles within the private and public sectors for over 40 years, currently a Member of the General Council of the King's Fund.

Mr Nikolai Demidenko

One of the finest concert pianists of his generation, Nikolai studied at the Moscow Conservatoire. Nikolai is Visiting Professor of piano at the University of Surrey.

Sir Richard Stilgoe

In the Jubilee honours list of 2012 Richard was knighted for charitable service through the Alchemy Foundation. He has spent over 50 years as a performer and writer.

» Vice-Chancellor's Award winners

The Vice Chancellor's Awards (2013) have been presented to individuals who have contributed to the University's achievements.



These awards provide a fitting opportunity to celebrate those who have made an exceptional contribution to the successes of the University.



Professor Sir Christopher Snowden
President and Vice-Chancellor

The VC's Award for Customer Service:

Miss Julia Ker works as the Language Facilities Supervisor in the School of English and Languages. She divides her time between technical support in the school and the Language Study Area in the Learning Centre.

The VC's Award for Health & Safety:

Ms Judy Peters won this Award for her contribution to Health and Safety in the Department of Chemistry and the University. These have been in the areas of Chemical Database and the University Chemical Amnesty.

The VC's Award for Enterprise:

Mrs Amy Cannie, Sports Participation Manager at Surrey Sports Park, manages the Sports Park's programme of activities which promotes healthy living and has a commercial benefit.

The VC's Award for Teaching Excellence:

Dr Chakravarthini Saaj is a Senior Lecturer and Deputy Head of the Surrey Technology for Autonomous systems and Robotics (STAR) Lab at the Surrey Space Centre.

The VC's Award for Research:

Dr Caroline Catmur is a psychologist and neuroscientist known for her ground-breaking work demonstrating the ontogeny of the human mirror neuron system and the interconnectedness between human sensorimotor learning and functioning of mirror neurons.



Professor Jonathan Seville, Dean of the Faculty of Engineering and Physical Sciences and Miss Zahida Batool, PhD Researcher

The VC's Award for Post-Graduate Research:

Miss Zahida Batool's project focuses on developing new semiconductors with the aim of producing high efficiency photonic devices such as lasers, photo-detectors and solar cells.

» Sports Review 2014

Sport is a defining part of many students' experience. Here we give a few examples of sports success in 2014 including some events hosted at our £36 million Surrey Sports Park.

The 2013/14 academic year saw Team Surrey achieve their highest ever BUCS finish, securing 36th place with over 1,800 students representing the University in sport. Surrey Sports Park also played host to BUCS Big Wednesday in March, seeing a number of national finals held at the University.

Over 500 Surrey alumni were welcomed back to the University in May for the first ever Grad Sport event as a number of current clubs took on their old teammates for a chance to lift the inaugural Grad Sport cup.

The year also saw Surrey Sports Park (SSP) increase its involvement with the Rugby Football Union, becoming a training base for the England Rugby Women's Sevens following their win at the 2014 World Cup during the summer. The Sports Park was also selected as a team base for the upcoming 2015 World Cup, with the Ireland and Italy Men's sides confirming their training camps at SSP.



Last year, Team Surrey saw nearly 2000 students participate in social sport.



Dan Jacobs

Vice President Sports and Recreation

It was a successful year for 'Team Surrey Sports Park' at the Glasgow 2014 Commonwealth Games, winning a total of nine medals in three different sports including six shared between Surrey Smashers Badminton stars Gabby Adcock and Chris Langridge.

Netball London Live was born in March 2014, which saw over 3,100 fans head to the Copper Box Arena and watch Surrey Storm defeat Hertfordshire Mavericks in front of a record UK domestic netball crowd.

Dan Jacobs, Vice-President Sports and Recreation, celebrates a successful year for sports participation at Surrey.

"Last year, Team Surrey saw nearly 2,000 students participate in social sport, specifically within our 'Play Sport' programmes designed for students who want to give sport a go in a fun, friendly, approachable environment. The programme has gone from strength to strength, with the number of sports available continuing to grow."

He added: "Team Surrey had a strong volunteering and community presence, with over 300 students getting involved. Events such as BUCS Big Wednesday and Netball London Live were fantastic opportunities for students to give back to the community. 2014/15 is looking to be a record breaking year for students engaging in social sport."

Surrey Storm vs Loughborough Lightning, Saturday 22 February 2014. Surrey Storm (black kit with blue trim) won 60 – 40





PAST, PRESENT & FUTURE

We continue to build on the foundations made by individuals and groups who work together to make Surrey a top ten university. Our projects are diverse and varied ranging from sustainability on campus to the exciting launch of our Veterinary School of Medicine and new partnership with the National Physical Laboratory.

Artist's impression of the School of Veterinary Medicine's large animal clinical skills building

▶ New School of Veterinary Medicine

In autumn 2014, the University of Surrey welcomed its first cohort of undergraduate Veterinary Medicine & Science students.

Our new School of Veterinary Medicine is currently under construction on the Manor Park campus. The £45m building project – comprising an Academic Building and Small Animal Clinical Skills Centre, a Veterinary Pathology Centre, plus a Large Animal Clinical Skills Centre, began in early 2014, and the complex will be complete in late summer 2015.

With an aim to develop veterinary professionals who fully understand and

can positively exploit the complementary relationship between research and clinical skills, our diverse Veterinary Medicine and Science (BVMSci) programme is delivered in partnership with veterinary practices and world-leading veterinary research institutes. This will give students the opportunity for real world, hands-on practical, clinical and research training from the start of their degree, as well as an awareness of the wide range of career opportunities available to veterinary scientists.



Artist's impression of the new School of Veterinary Medicine, Manor Park campus



The Supervet at Surrey

Noel Fitzpatrick, Professor of Orthopaedics

Professor Noel Fitzpatrick, known as the Bionic Vet for his work in developing cutting-edge prosthetic limbs, has worked closely with the University on the development of the School of Veterinary Medicine, and is a key member of teaching staff, passionate about the cross-pollination of ideas and philosophies between veterinary and human medicine.



I look forward to watching our students develop into a new kind of veterinary professional with a strong sense of purpose and identity, and a passion for their role in protecting animal and human health.



Noel founded Fitzpatrick Referrals in 2005 and his latest TV Series, *The Supervet*, was broadcast in autumn 2014. He has been awarded an Honorary Doctorate for his contribution to medical science.

▶ Surrey partners with National Physical Laboratory



Collaboration between the University of Surrey, the University of Strathclyde and the National Physical Laboratory will strengthen measurement science and create a new Postgraduate Institute.



National Physical Laboratory (NPL), Teddington

the international system of measurement units and support national and international scientific challenges. NPL's measurements help to save lives, protect the environment and enable citizens to feel safe and secure, as well as supporting international trade, companies and innovation.

An important focus of the partnership will be the establishment of a new Postgraduate Institute which will train high-calibre PhD students and provide a pipeline of professionals skilled in the area of measurement science. In addition, a series of regional NPL hubs will be created to disseminate and build on expertise, and meet local business needs.

Professor Sir Christopher Snowden, President and Vice-Chancellor for the University of Surrey, said, "This strategic partnership will draw on the partners' combined expertise [... and] NPL's focus on scientific excellence and industrial impact perfectly complements Surrey's world-class research in the key areas of electronics, communications, physics, health, medicine and space science. By expanding the partnership's research community and capabilities, we are confident that the effects will not only be felt by industry across the UK, but also internationally."

The University of Surrey, along with the University of Strathclyde, has been selected to enter into a partnership with the Department for Business, Innovation & Skills (BIS) to lead the world-renowned National Physical Laboratory (NPL), a global centre of excellence in measurement science.

NPL is the UK's National Measurement Institute and has developed and maintained the nation's primary measurement standards for more than a century. It maintains a wide portfolio of internationally competitive research programmes that advance measurement science, underpin

► Sustainability on campus

At Surrey, we take sustainability seriously and continue to invest in projects ranging from a new campus garden to energy saving initiatives.



From left to right: Charles Gray, Surrey Garden Society President, Emily James, Surrey Garden Society Vice-President, Victoria Johnsen, Environmental & Cultural Change Manager, Matthew Arnold, Carbon Manager

The creation of the University Campus Garden has been a milestone for 2014. A large fruit and vegetable garden, funded by a donation from the University Annual Fund, has been developed on the Stag Hill campus. The Surrey Garden Society, formed to run the project in June 2014, has become the fastest growing club in the Students' Union. There has been a huge amount of enthusiasm for this project and this time next year we should see the results in the shape of the first harvest.

Surrey's work on reducing our waste and increasing recycling has also continued. In particular, we have developed our strong partnership with the British Heart Foundation. For the first year, the University and BHF partnered with Guildford Borough Council to extend the end of year donation campaign off campus. Our staff and students donated over 9,000 charity bags, estimated to have raised £192,000 to help fund the BHF's life-saving work.

435

TONNES OF CO₂ SAVED EACH YEAR

The University has continued to invest in improvements across campus, investing nearly £500,000 on lighting upgrades across five academic buildings, saving over £100,000 in energy costs and 435 tonnes of CO₂ each year. This work has gone hand in hand with a new series of communication and behaviour change programmes aimed at reducing energy consumption by both staff and students. The NUS Green Impact Awards scheme for staff and the Student Switch Off programme for students living on campus, were both run for the first time in 2013 and were so successful that Surrey has committed to running them again in 2014/15.

All of these projects and many more are compiled in the University's ongoing work on the EcoCampus Environmental Management System. Surrey achieved the Silver phase award in July 2013 and is currently working towards the Gold award accreditation, aiming to achieve the Platinum Award by 2016.

► A life remembered — Professor Anthony Kelly

In June 2014, we were saddened to hear of the death of Professor Anthony Kelly, a former University of Surrey Vice-Chancellor from 1975–1994.



Professor Anthony Kelly first conceived of the idea for the Surrey Research Park during a sabbatical term in Switzerland in 1979 and a small group (including in particular Jerry Leonard, University Treasurer and Leonard Kail, University Secretary) took the development forward by forming a Board, recruiting a member of academic staff who then created the team to develop what the Park is today. Professor Kelly recognised the importance for Surrey of developing its

own endowments to support it because he realised how vulnerable Surrey would be if government funding for Higher Education continued to be reduced.

During the tenure of Professor Kelly's vice-chancellorship from 1975–1994, the number of full time students at Surrey increased from 3,000 to 7,000 with a significant increase in the proportion of postgraduate students. Professor Kelly

was a strong advocate of the Professional Training year which has made a major contribution to Surrey's consistently high graduate employment record. Professor Kelly continued to make a major impact on his own discipline. He was elected to the Fellowship of Engineering (now the Royal Academy of Engineering) in 1979, to the National Academy of Engineering of the USA in 1986 and to the Academia Europaea in 1990. He is regarded by many as the 'father of the composite materials' and received the President's Award of the Royal Academy of Engineering in 2011 in recognition of a lifetime of significant achievement throughout a career spanning more than sixty years.

Professor Kelly died peacefully in his sleep at home on 4 June 2014.

We are also sad to report the passing away of the following colleagues and friends in 2014:

Professor John Hay; Dr Nina Veniaminovna Hilsdon; Sir Diarmuid Downs CBE FREng FRS; James (Jim) Moore; William (John) Malcolm Salter; Dr Leo Schenker; Glyn Davies.

▶ Continuing progress towards longer term goals

The University achieved a surplus of £4.1m in 2013/14, said Chief Financial Officer, David Sharkey.



He explained, "This reflected a £0.9m increase on the previous financial year in a period of further strategic investment and in a challenging operating environment."

"The University has made significant investments in quality in recent years; through higher entry tariffs, additional academic staff and a new School of Veterinary Medicine. Whilst delivering longer term benefit, these strategic investments have put pressure on the level of surplus in the short term."

He added, "The continuing freeze of the £9,000 fee cap for Home/EU undergraduates reflects a real terms cut in income at a time of raised student expectations. The University continues to seek opportunities to improve efficiency in order to release funds to further enhance the quality of both the academic and non-academic student experience."

He continued, "In terms of capital investment, 2013/14 saw the start of construction of the new £10m 5G Innovation Centre building and the £45m Vet School. Both schemes are on track and on budget with with the



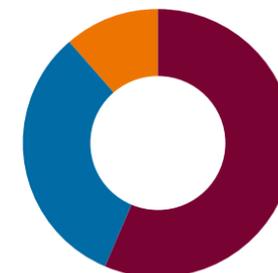
The University has made significant investments in quality in recent years; through higher entry tariffs, additional academic staff and a new School of Veterinary Medicine.



David Sharkey
Chief Financial Officer

former due to open in spring 2015 and the latter in time for the start of the 2015/16 academic year."

Mr Sharkey concluded, "All universities face further uncertainties over the funding of higher education after the 2015 General Election. However, the revenue and capital investments we are making strengthen the University's ability to face the challenges and to achieve its strategic goals to be a leading national and international university, delivering excellence in learning and teaching, and in research."



2013/14 consolidated income showing percentage change from 2012/13

Funding council grants	£34.8m	-13%
UK/EU undergraduate/postgraduate tuition fees	£41.6m	+24%
Non-EU tuition fees	£35.0m	-8%
NHS/Other tuition fees	£20.4m	-3%
Research income	£29.6m	+3%
Other income	£47.3m	+13%
Research Park/investments	£10.4m	+1%
Total income	£219.1m	

2013/14 consolidated expenditure showing percentage change from 2012/13

Staff costs	£121.7m	+5%
Other operating expenses	£69.4m	-4%
Depreciation & interest	£24.2m	+5%
Total expenditure	£215.3m	
Other items*	(£0.3m)	
Total expenditure and other items	£215.0m	

*Other items comprise taxation and transfers from endowments

Movement in consolidated net assets 2013/14

Consolidated net assets at 31 July 2013	£198.2m
Surplus for the year	£4.1m
Actuarial lossess on pension schemes	(£8.5m)
Investment property revaluation	£11.3m
Other movements	(£2.6m)
Consolidated net assets at 31 July 2014	£202.5m

FINANCIAL REVIEW

The summarised financial statements comprise the consolidated results of the University (including its Foundation Fund) and its subsidiary companies, notably Surrey Sports Park Limited.

Income and expenditure

Consolidated results

The University achieved a consolidated surplus for 2013/14 of £4.1m. This represented a £0.9m increase on the previous financial year.

Consolidated income rose by £5.4m (2.5%) to £219.1m.

Core University activities

The University's core activities include the activities of Surrey Sports Park Limited. They exclude the activities of the Surrey Research Park.

In the past two years the University has invested heavily in the quality of its students, in academic staffing and in its new School of Veterinary Medicine. As expected, these strategic investments have put short term pressure on the net surplus and the University returned a deficit on its core activities in 2013/14 of £0.7m (2012/13: £2.1m deficit).

Total income from core activities grew by £5.2m (2.6%) to £209.4m.

The further shift of funding from the State to students under the new undergraduate funding regime gave rise to a £5.4m (13.4%) fall in Funding Council Grants to £34.8m. This was more than offset by an increase of £9.4m (38.0%) in income from Home/EU Undergraduates to £34.1m, reflecting not only the second year of the £9,000 fee, but also the significant increase in the 2013/14 student intake.

Despite this £9.4m rise in income from Home/EU undergraduates, total fee income rose by a more modest £4.5m (4.8%) to £97.0m. This reflected the challenges which Surrey, like many other universities, is facing in the postgraduate recruitment markets (both in the UK and overseas).

Research income grew by £0.8m (2.7%) to £29.6m.

Expenditure on core activities increased by £2.7m (1.3%) to £210.4m. Staff costs (excluding restructuring costs) rose by £5.4m (4.7%) to £120.7m due to the investment in academic staff described above.

Foundation Fund

The Surrey Research Park, which is the Foundation Fund's main asset, continues to provide a useful source of independent income. Foundation Fund income for the year totalled £9.7m (2012/13: £9.5m). The surplus (before the sale of land to a subsidiary company) was £4.8m (2012/13: £5.2m).

Balance sheet

Consolidated net assets rose in 2013/14 by £4.3m (2.2%) to £202.5m, with the upward revaluation of the Research Park largely offset by pension fund actuarial losses and other downward movements.

The value of completed investment properties on the Research Park rose by £12.0m to £91.2m – the highest carrying value of the Park since its peak of £101.4m in 2007.

Pension fund actuarial losses of £8.5m were mainly the result of a fall in the net discount rate which is used to calculate the liabilities. The overall increase in the balance sheet pension liability was £7.9m.

Cashflow

Cash plus short term investments increased in the year by £31.4m to £74.4m. This rise was driven largely by the receipt of £34.0m of loan drawdowns and HEFCE capital grants in advance of spend.

Offset against this £74.4m of available cash were borrowings of £178.8m, giving net debt at 31 July 2014 of £104.4m. This represented a £2.5m fall in net debt in the year, with net debt representing 51.5% of total funds at 31 July 2014 compared with 53.9% at the start of the financial year.

Summary consolidated income and expenditure account for the year ended 31 July 2014

	2013/14 (£m)	2012/13 (£m)
Total income	219.1	213.7
Total expenditure	(215.3)	(212.0)
Surplus before taxation	3.8	1.7
Taxation and transfers from endowments	0.3	0.2
Exceptional item – surplus on disposal of building	0.0	1.3
Retained surplus for the year	4.1	3.2

Summary consolidated balance sheet as at 31 July 2014

	2013/14 (£m)	2012/13 (£m)
Fixed assets	338.0	330.0
Endowment asset investments	55.3	44.2
Current assets	98.1	63.0
Creditors: amounts falling due within one year	(79.9)	(66.8)
Total assets less current liabilities	411.5	370.4
Creditors: amounts falling due after more than one year	(172.2)	(143.4)
Provisions for liabilities and charges	(1.5)	(1.4)
Pension liability	(35.3)	(27.4)
Total net assets	202.5	198.2
Deferred capital grants	51.9	54.4
Endowments	55.3	44.2
Reserves	95.3	99.6
Total funds	202.5	198.2

Capital investment

Additions to tangible fixed assets in the year totalled £27.4m (2012/13: £24.2m).

2013/14 saw the start of construction of the £10m 5G Innovation Centre building and the £45m Vet School. 2013/14 expenditure on these schemes amounted to £2.6m and £6.7m respectively.

Summary

The last twelve months have seen further investment as the University continues to progress towards its strategic goals. Whilst the net surplus remains under pressure in the short term, the University has a clear strategy taking it through to 2020 and beyond, building on its successes and investments to ensure its financial sustainability.

INDEPENDENT AUDITOR'S STATEMENT TO THE UNIVERSITY OF SURREY ('THE UNIVERSITY')

We have examined the summarised financial statements of the University of Surrey for the year ended 31 July 2014 which comprise the summary consolidated income and expenditure account and the summary consolidated balance sheet, which are set out on page 87 of the University's Annual Review ('Annual Review'). The summarised financial statements have been prepared by the University Council for the purpose of inclusion in the Annual Review, as explained in the note.

This statement is made, in accordance with our engagement letter dated 21 November 2011, solely to the University, in order to meet the requirements of paragraph 36 of the Statement of Recommended Practice: Accounting for Further and Higher Education (2007). Our work has been undertaken so that we might state to the University those matters we have agreed to state to it in such a statement and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the University for our work, for this statement, or for the opinions we have formed.

Respective responsibilities of the University Council and auditor

The Council has accepted responsibility for the preparation of the summarised financial statements in accordance with paragraphs 29 to 35 of the Statement of Recommended Practice: Accounting for Further and Higher Education (2007). Our responsibility is to report to the University our opinion on the consistency of the summarised financial statements on page 87 within the Annual Review with the full financial statements.

Note

The summarised financial statements for the year ended 31 July 2014, which comprise the summary consolidated income and expenditure account and the summary consolidated balance sheet, have been prepared by the Council of the University of Surrey for the purpose of inclusion in this Annual Review. The summarised financial statements are an extract of the full financial statements on which the auditor issued an unqualified opinion.

Professor Sir Christopher M. Snowden FRS FREng
President and Vice-Chancellor

We also read the other information contained within the Annual Review and consider the implications for our report if we become aware of any apparent misstatements or material inconsistencies with the summarised financial statements.

Basis of opinion

We conducted our work having regard to Bulletin 2008/3 'The auditor's statement on the summary financial statement' issued by the Auditing Practices Board. Our separate report on the University's full financial statements for the year ended 31 July 2014 describes the basis of our statutory audit opinion on those financial statements.

Opinion

In our opinion, the summarised financial statements set out on page 87 are consistent with the full financial statements for the year ended 31 July 2014.

Chris Wilson
For and on behalf of KPMG LLP, Statutory Auditor
Chartered Accountants
1 Forest Gate, Brighton Road
Crawley
RH11 9PT

28 November 2014

The full financial statements were approved by the University Council on 20 November 2014.

The full audited financial statements and independent external auditor's report can be obtained from the Chief Financial Officer, University of Surrey, Guildford, Surrey, GU2 7XH.

Dr Jim Glover
Chair of Council

Disclaimer

Every effort has been made to ensure the accuracy of the information contained in this publication at the time of going to press (December 2014). The University reserves the right, however, to introduce changes to the information given.

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