UNIVERSITY OF SURREY

Knowledge Transfer Account

Review 2009/10

Innovation Powered.

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It’s been a great first year for the Surrey KTA, and we are just as excited about the years to come.

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INTRODUCTION

For the University of Surrey, simply generating new knowledge has never been enough.

Though our research centres lead the world in many vital scientific areas, we've always focused on getting our ideas out of the lab and into projects that can make real improvements to people's lives.

So when the Engineering and Physical Sciences Research Council (EPSRC) launched a major new initiative called the Knowledge Transfer Account in 2008, we were naturally keen to become a part of it.

The Knowledge Transfer Account (KTA) programme addresses the need to fully exploit the research funded by EPSRC, and therefore increases the benefits of having invested resources in that research. KTAs foster an environment in which impact and the transfer/exchange of knowledge are valued and encouraged just as much as the generation of original research results.

EPSRC awarded us a £3.85m KTA in 2009, one of 12 KTAs arranged across the UK.

The Surrey KTA runs in partnership with the National Physical Laboratory (NPL) and has developed three Platforms, each based on our EPSRC-funded research in key areas. These three Platform areas are:

- Communications and Signal Processing
- Nanotechnology and Photonics
- Next Generation Materials and Characterisation

> "The Surrey KTA aims to exploit over £50m of 5 and 5* rated research from our EPSRC portfolio.

Together with industrial partners and experts in knowledge exchange, the Surrey KTA removes barriers to exploitation and delivers real, tangible benefits to the UK's economy and society. It connects University research with potential users, identifies appropriate partners and markets, and enhances research creativity.

In short, it gives us another way of using our world-class EPSRC-funded research to help businesses grow through innovation. It increases our ability to work with industrial partners to solve real world problems. It means that we can work with a larger number of organisations to make an even bigger impact together.

And that, after all, is what we've always done best.

£1bn

The University delivers £1bn to the regional economy via the Surrey Research Park and other external activities.

OVERVIEW

It's been a great first year for the Surrey KTA. Professor Steve Williamson, Deputy Vice-Chancellor (Research and Innovation) and Surrey KTA Principal Investigator, looks back at what we and our partners have achieved so far.

"The award of the EPSRC Knowledge Transfer Account (KTA) provided us with an excellent opportunity to showcase the world-class research being undertaken by our renowned academics. But it also allows us to affirm our track record as a leading university for innovation and commercialisation.

The KTA allows us to expand our efforts in successful collaborations and partnerships with industry, and the advice received from a wide range of local, national and international organisations via the Board and Platform Advisory Groups can only strengthen this.

We have had several successes in the year following the Surrey KTA's launch in October 2009.

A total of 27 projects have been funded, leading to new collaborative ventures between our academics and external organisations worth over £1.3m. Examples of the research being exploited include a new way to improve sound quality for the hard of hearing and a new screening test for oral cancer – read more about these and other case studies on pages 8–15.

In the summer of 2010 the KTA, alongside colleagues from Surrey Space Centre and the Centre for Communication Systems Research, exhibited at the Farnborough International Air Show. The event allowed us to promote opportunities for exploiting our research to the 1400 other exhibitors and the many thousands of visitors. A highlight of the show was the praise given to the work of our scientists by David Willetts, Minister of State for Universities and Science.

September 2010 saw the launch of a partnership between the University and the Nanotechnology Knowledge Transfer Network (NanoKTN), called BlueSkyNano. This innovation voucher scheme is aimed at encouraging interaction between industry and academia, and we are delighted to be involved with it.

It's been a great first year for the Surrey KTA, and we are just as excited about the years to come. We talk more about our plans for the future on page 32.

50
external organisations

Over 50 external organisations are now working with the Surrey KTA, including project stakeholders, advisory group members, partners, and so on.

Professor
Steve Williamson
Deputy Vice-Chancellor, Research and Innovation

"A highlight of the year was the praise given to the work of our scientists by David Willetts, Minister of State for Universities and Science.

KTA CASE STUDY

Project title: Understanding the Dynamics of Real Faces

Academic: Professor Adrian Hilton

Despite advances in visual effects, animators are still challenged by 'digital double faces'. This is where animation, modelled in 3D, is superimposed onto footage of a real actor to create a realistic, moving animated face.

Traditionally, this has involved 'manual' animation in post-production. This method is lengthy, complex, inefficient and expensive. Animators may be forced to accept a poorer quality of effect or to re-use footage, especially for lower budget productions.

The problem is that each video frame is separate. Animators need to track facial features, but with raw footage they won't know where these features are from one frame to the next. A form of manipulated footage is required that automatically tracks each of the features as they move from frame to frame.

In 2004, a team from our Centre for Vision, Speech and Signal Processing (CVSSP) started to develop a solution to the problem. But though the potential use in video production was clear, CVSSP didn't have the means for direct application into production software.

Thanks to the KTA and an existing long-term collaboration between CVSSP's Professor Adrian Hilton and leading London-based visual-effects company Framestore, we have been able to establish a project that will develop the necessary integration of our technology into useable software.

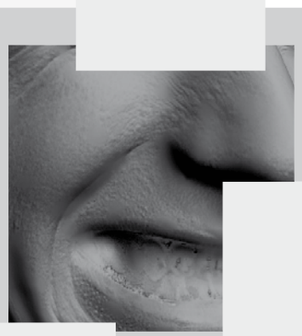
With the help of KTA funding, Surrey research fellow James Edge has been seconded to Framestore to work directly with their animators and clients (such as Warner Bros). Combining our on-campus facial-capture systems with Framestore's production tools and experts, James is creating a front-end system that can be used by animators who don't have specialist knowledge of the science behind the tracking method.

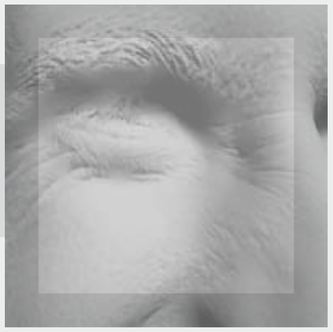
Working day-to-day with the animators has also enabled James to develop other useful tools that are already having an impact on current Framestore projects.

"Current processes present several substantial research challenges which require skills that don't match the majority of our internal computer graphics research experience," explained Martin Preston, Head of Research at Framestore. "We have turned to Surrey to help supplement our own skills, specifically in the area of computer vision.

"The KTA programme has enabled us to begin the process of adapting research to a production environment, and to evaluate how the state of the art in vision-based facial capture can help us improve the quality of our digital doubles."

This KTA project will help the UK's film and visual-effects community to compete globally, and give animators the tools to become even more creative. Reproducing actors' performances without having to animate every frame by hand will be a real boon to their progress.





> "The KTA has enabled us to begin the process of adapting research to a production environment.

KTA CASE STUDY

Project title: Dielectrophoretic Wells – Early Screening for Oral Cancer

Academic: Dr Fatima Labeed (research leader)
Hayley Mulhall and Karen Graham (researchers)
Dr Kai Hoettges and Professor Michael Hughes (system developers)

Despite some advances in detection technology and treatment methods, the survival rate for sufferers of the most common oral cancer (oral squamous cell carcinoma, or OSCC) is still alarmingly low. Approximately 50 per cent of patients die within five years of diagnosis.

Typically, the disease will have become aggressive before diagnosis is made, and many patients must undergo disfiguring and debilitating surgery to physically remove large areas of the face and/or neck. Conventional treatments such as radiotherapy may affect speech, taste and saliva production.

Cancer testing often requires invasive and lengthy diagnosis procedures, such as biopsies and histopathology, but the mouth is easily accessible so oral cancer should be easier to detect at an early stage. However, because early-stage cancers look like normal mouth ulcers, they are often misdiagnosed until they are significantly advanced.

To address this, a research team from our Centre for Biomedical Engineering developed an innovative testing technique using dielectrophoresis (DEP), which identifies the electrical properties of cells collected via brush biopsy.

Working in collaboration with UCL through Professor Mark Lewis, and Professor Stephen Porter and Dr Stefano Fedele of the Eastman Dental Institute, the team tested a small number of volunteers. Samples were taken from patients diagnosed with oral cancer, from patients with abnormal (dysplastic) lesions, and from healthy patients.

"Using DEP, we have identified differences between the 'electrophysiological fingerprints' of normal and cancerous tissue from the oral mucosa," explained research leader Dr Fatima Labeed.

"KTA funding is allowing us to develop our technology further, and to begin clinical trials. Currently the tests must take place in the lab, so we are investigating ways to make the chip system quicker and more compact.

"There remains a need for rapid, early and accurate detection of OSCC in the primary health care setting. This work seeks to develop a simple, cheap and accurate means of detecting this increasingly common disease. We need a device that primary care clinicians can use within surgeries so that oral-cancer screening and early diagnosis can become a matter of routine.

"This can be a horrific cancer, so we're working hard to speed up detection and diagnosis."

The team has already had significant interest from companies keen to work with us to develop the product for market. Longer term, the team is also developing the use of DEP in optimising the preparation of samples for less accessible cancers, such as those of the blood, liver or bladder.

"KTA funding is allowing us to develop our technology further, and to begin clinical trials.

KTA CASE STUDY

Project title: IKinema

Academic: Dr Alexandre Pechev

Computerised animation has come a long way in a relatively short time, but the graphics in modern computer games are not always as sophisticated as they seem. Because of the challenges involved in realistic animation, many character movements are actually just pre-stored sequences linked together when the computer is given a command.

For example, if a player wants a character to climb a rope, the game will employ a pre-recorded animation sequence to depict this. But the animation process is still cumbersome and expensive for developers, and despite the various camera tricks employed to disguise it, the result is less involving, fluid and realistic than gamers would like.

Now rewind a little to Dr Alexandre Pechev's office in the Surrey Space Centre at the University of Surrey. Dr Pechev had recently come up with an idea for addressing a tricky problem affecting satellite control systems when he saw that the solution could be extended via robotics to the way characters are animated in computer games.

He realised that just by moving the end points of a character's limbs, he could get the computer to fill in the rest of its body movements in real time. This would allow animators to depict movement in a fraction of the time it currently takes, and with much more realism as well.

> "The computer games industry employs over 28,000 people and contributes £1bn to the UK economy.

His technique allows the animator to specify constraints – position, orientation, force or centre of mass – and manipulate them to generate lifelike motion. His technology is unique as it instantly animates the whole body of an animated character, and automatically takes into account gravity and balance to easily produce realistic, lifelike, fluid movement.

After developing the idea and building his technology, Dr Pechev launched his spin-out company – IKinema – with the help of the University's Research and Enterprise Support unit (RES). KTA funding and support has enabled Dr Pechev and his team to develop the technology further and work with a range of contacts in industry to produce cross-platform applications for a variety of markets, from animators to end-users.

IKinema's progress was recognised in March 2010 when the Royal Academy of Engineering gave Dr Pechev its Entrepreneur Award, and in September 2010 he also won the Royal Society of Edinburgh/Science and Technologies Facilities Council Enterprise Fellowship.

The computer games industry employs over 28,000 people and contributes £1 billion to the UK economy. IKinema has the potential – recognised in these prestigious awards – to have a far-reaching impact on computer animation, gaming and robotics. It should, therefore, prove a tremendous boost to the UK economy.

KTA CASE STUDY

Project title: Improving Speech Intelligibility

Academic: Dr Banu Gunel

People who are hard-of-hearing have difficulty picking out specific sounds from background noise. Consequently they may be unable to hear or understand speech, which can lead to feelings of isolation.

Currently, induction-loop systems and hearing aids can be used to improve the volume of ambient sounds, but this process is not yet able to target and amplify specific sounds effectively.

In response to this situation, a team from the University of Surrey has developed an innovative 'sound-separator' device that can be used at the front end of induction-loop systems or assisted-listening devices to isolate sounds and improve speech intelligibility.

This solution is not simply a noise-cancelling system, for 'noise' is subjective to the listener. Instead, our new device uses a freestanding processor to give users the ability to select which sounds to listen to, and to balance volume across an unlimited number of target sounds.

"This system is about giving listeners the flexibility to create their own acoustic environment," explained research leader Dr Banu Gunel. "The listener can even control the amplitude for those sounds they are choosing to listen to.

"For example, if the listener wants to hear two people talking, but one is naturally much quieter than the other, they can increase the volume of the quieter talker, and reduce that of the other."

This would not be possible with existing sound-processing systems as they require large microphone arrays, and the necessary algorithms would not work in real time. The listener would not hear the output in synchronicity with lip movements, and the target sound would not be captured satisfactorily.

These problems are solved with our team's novel system, but there is still work to do.

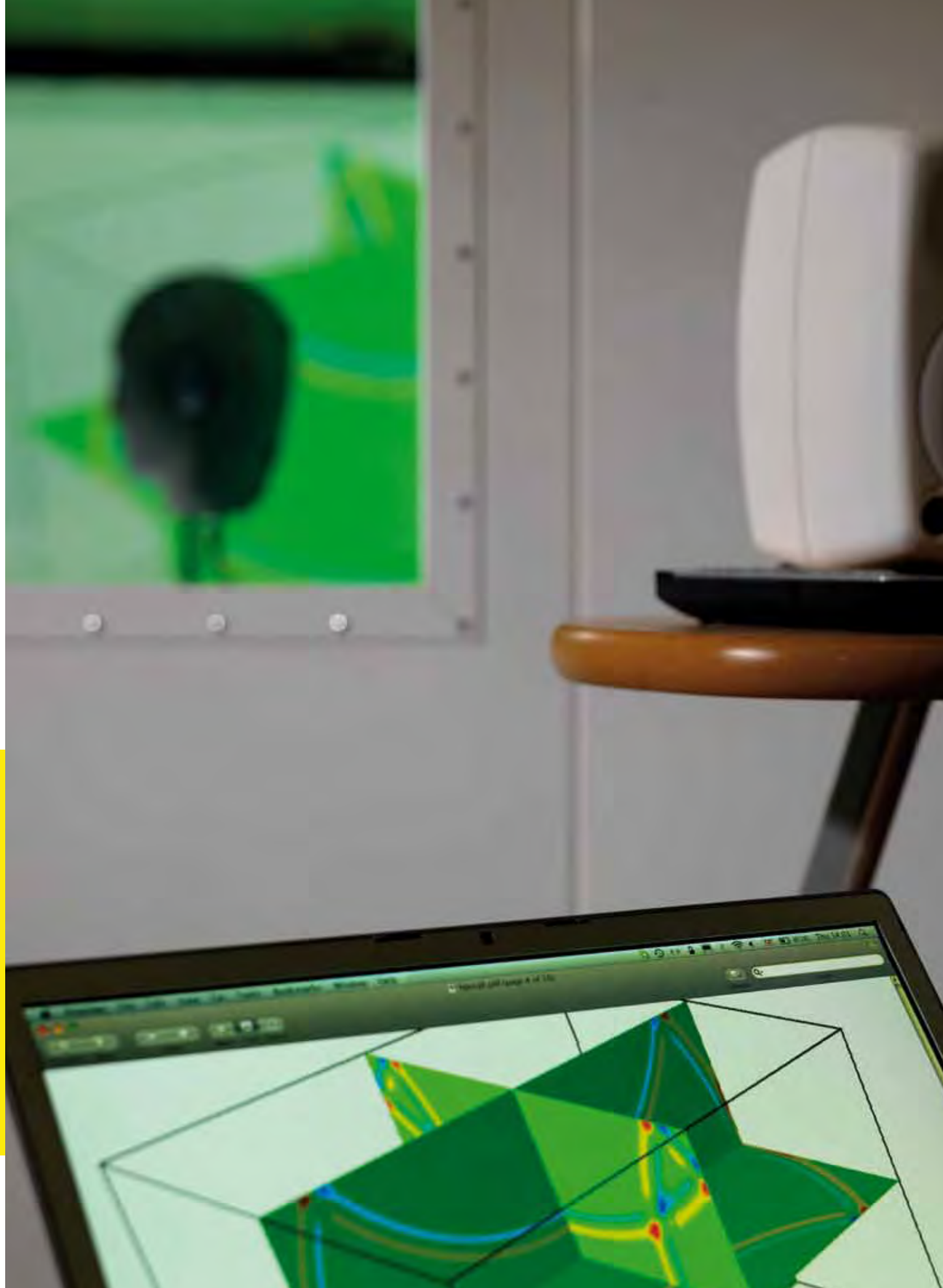
So, using KTA funding, we are working in partnership with the Royal National Institute for the Deaf/Action On Hearing Loss (RNID) to test how much benefit the system brings to users, and under which circumstances it is most effective.

RNID's listening panels have provided significant feedback on their interactions with the device, as well as suggestions for improvements. Users have reacted positively to the prototypes, and the tests show an impressive success rate for assisting listeners in separating and interpreting sounds.

But the technology is not specific to speech. In fact, there is no restriction on the content of the sound. The system is capable of 'cleaning' very rich sounds, including those from musical instruments.

We therefore see potential applications for this technology in other areas, such as studio recording. For example, producers could record an ensemble and reduce the sound of one particular player who is making mistakes.

> "I wholeheartedly recommend working with the University of Surrey via the KTA. They professionally manage the partnership, and bring far more than just their knowledge to the table. The technology they have developed and the work they have carried out with us has the potential to revolutionise communication aids for deaf and hard-of-hearing people.
>
> Thomas Fiddian RNID



PLATFORM-SPECIFIC RESEARCH

The Surrey KTA operates in three broad areas of our expertise in order to exploit research funded by EPSRC.

The globalised society has a voracious appetite for better communication, and a dizzying ability to generate new media forms.

Such frenetic change makes predicting trends a real challenge. Providing the technological improvements that will underpin future understanding and development requires a sophisticated approach to research.

To address these problems and opportunities, we were pioneers in bringing Departments together to share ideas and expertise in the field of Communications and Signal Processing.

Our research in this area is carried out within and among the following main centres:

The **Centre for Communication Systems Research (CCSR)** is the UK's largest academic communication research centre. We manage a research portfolio of £12m, focused on future communication systems such as:

- Mobile/wireless and satellite, cellular mesh, ad-hoc and sensor networks
- Future Internet and Internet of Things
- Cognitive radio and systems
- Applications and service provision
- Energy minimisation for ICT

The **Centre for Vision, Speech and Signal Processing (CVSSP)** advances the state of the art in multimedia signal processing and computer vision, with a focus on image, video and audio.

Our research is structured into four main areas: Multimedia Signal Processing and Interpretation, Visual Media, Medical Imaging, and Robot Vision.

We are one of the largest centres of our kind in the UK, with around 100 researchers, students and staff. Our annual research income is in excess of £9.5m, about 90 per cent of which is in the form of grants won from EPSRC, the EU and industry.

COMMUNICATIONS AND SIGNAL PROCESSING

> "There are over 107,000 UK companies competing internationally in the IT and Telecoms industry.

Three dedicated laboratories are associated with CCSR and CVSSP:

- **I-Lab** researches multimedia delivery and user quality of experience
- The **Digital World Research Centre** looks at the ergonometric, usability and sociological aspects of ICT
- The **Sound Recording Institute** investigates audio quality, perception and measurement

In the **Department of Computing**, we concentrate on four main areas:

- Computational models and algorithms inspired from natural intelligence
- Security- and safety-critical domains, including digital watermarking, information hiding, trustworthy voting systems, and so on
- Formal methods of integration for software systems development
- Digital ecosystems – understanding and modelling the behaviour of complex, pervasive technology systems, and their application in real-world environments

The **Surrey Space Centre** researches various aspects of satellite design, control and applications. Our innovations also find application in robotics, semiconductor design, computer gaming and resilient software systems.

Other Departments in the University work in related fields, but with the same dedication to solving real-world problems. For instance, our expertise in signal processing extends to medical physics and nuclear research, and we also develop communications expertise for health care and environmental management.

PLATFORM-SPECIFIC RESEARCH

The Surrey KTA operates in three broad areas of our expertise in order to exploit research funded by EPSRC.

Breakthroughs in nanotechnology and photonics are coming thick and fast. The potential is staggering, but the challenge is to make sure that there are no log-jams in taking the latest knowledge out to where it can help solve real world problems.

This, of course, is the aim of our Knowledge Transfer Account. But you must have knowledge to transfer in the first place, and our Advanced Technology Institute (ATI) leads the world in nanotechnology and photonics research.

Opened in 2002, the ATI comprises four groups and boasts 150 researchers.

The Nano-electronics Group focuses on cross-cutting themes including energy, Next Generation high-speed and flexible electronics, communications, and health care. With world-leading experts such as Professor Ravi Silva, the ATI is at the very forefront of international efforts to harness the possibilities of nanotechnology.

In photonics, we lead a five-year £5m Silicon Photonics Consortium (including QinetiQ, Intel and four other universities). We have also been awarded a European Research Council Advanced Investigator Grant to extend our work in quantum photonics on dislocation engineering and silicon light emitters.

This research is filling in the missing links that will enable fully integrated silicon photonic systems, which will represent a truly significant breakthrough. The resulting intellectual property will be exploited via Si-Light Technologies, a University of Surrey spin-out. We have an enviable record of such company spin-outs, and the ATI has spawned four such enterprises to date.

One of these is Surrey Nanosystems, a joint venture with CEVP, a manufacturer of chemical vapour deposition tools. Surrey Nanosystems is the only company in the world currently able to make carbon nanotubes at CMOS-compatible temperatures.

> “The UK nanotechnology industry is one of the fastest growing and most innovative in the world – it is forecast to grow by 44% over the next 12–15 years.

NANOTECHNOLOGY AND PHOTONICS

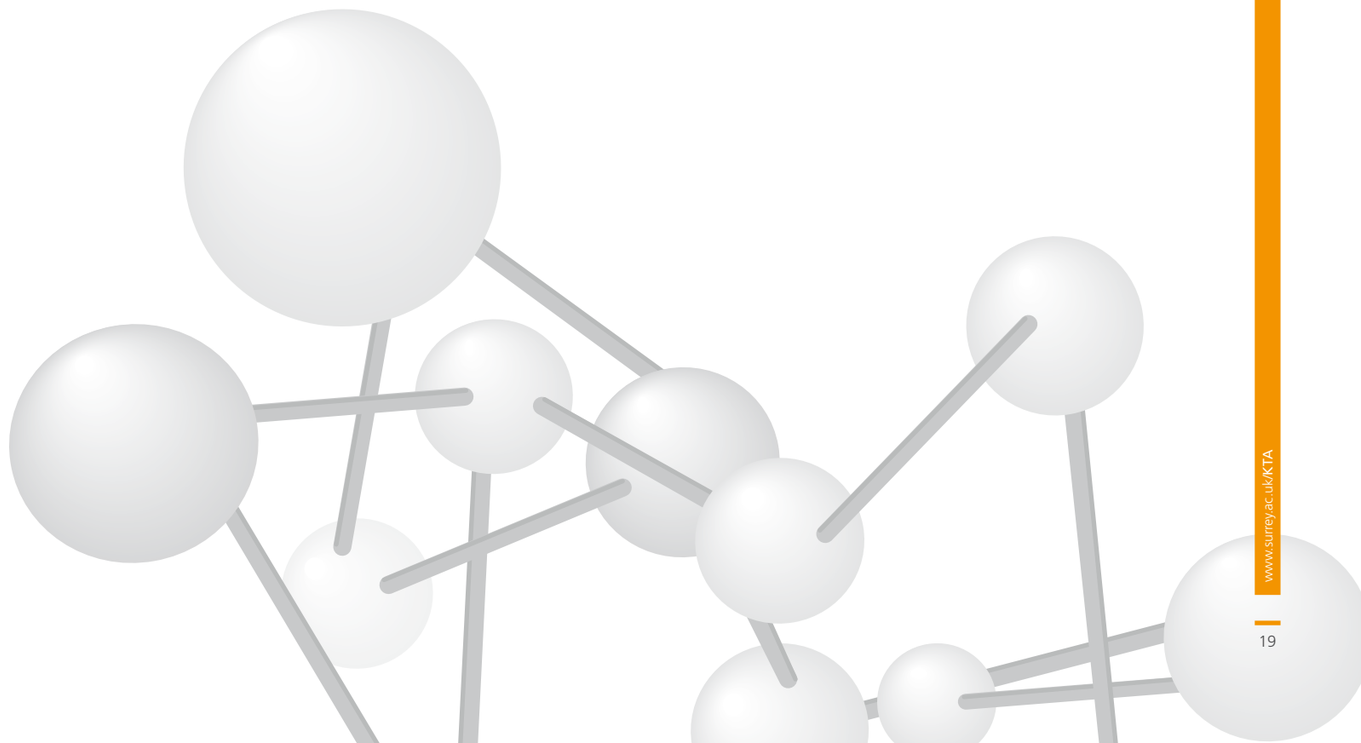
The ATI is also driving innovation in improved materials for solar cells using nanocarbon composites. We are currently working on a project funded by E.On and EPSRC to develop organic–inorganic hybrid solar cells, a field in which we hold a number of key patents.

Our research has also created nanosensors that can be incorporated into food packaging to monitor food spoilage, as well as new types of moisture-barrier coatings with enormous applications in various industries including aerospace and electronics.

Our commitment to developing the next generation of solar-cell devices prompted us to establish a Chair of Solar Energy Technology in early 2010. This move will focus our pursuit of further breakthroughs in this vital area.

We have great confidence in our ability to produce world-changing innovations in these fields, and the record of achievement to justify it.

For example, the strained quantum-well laser was invented in our Photonics Group by Professor Alf Adams FRS. This technology is now used in every CD/DVD player and optical-fibre system. It is precisely this kind of cutting-edge research with practical applications that we have always thrived on, and which drives our research in nanotechnology and photonics.



PLATFORM-SPECIFIC RESEARCH

The Surrey KTA operates in three broad areas of our expertise in order to exploit research funded by EPSRC.

In the current economic climate, smart materials and advanced characterisation will provide the impetus for economic growth, pervading all aspects of our society and underpinning virtually all areas of economic activity.

Future prosperity relies on clean, efficient solutions to society's needs, improving performance, reducing waste and harnessing scarce resources. Our world-leading research in the development, characterisation and application of advanced materials plays a vital role in the UK's economic prosperity.

> "The turnover of businesses in the UK that produce, process, fabricate, characterise and recycle materials is around £200bn.

Our **Ion Beam Centre (IBC)** is the national centre for ion beam applications and analysis. Funded by EPSRC as a national facility since 1978, and jointly awarded the Queen's Anniversary Prize in 2002, we currently provide research expertise and access to facilities for EPSRC grants worth over £60m.

The IBC works actively with over 20 industrial companies worldwide at any one time, and is linked, through a European infrastructure project called SPIRIT, with other laboratories across Europe to provide access to ion beam expertise and facilities for the European Community and associated member states. Work undertaken within the IBC and transferred to industry is estimated to have generated millions of pounds for the UK economy.

The **Surrey Materials Institute (SMI)** brings together researchers in engineering, physics, chemistry and the biomedical sciences. This is a world-class interdisciplinary centre for research on interface science and engineering, surface phenomena, and materials functionality. We make major advances in adhesion of polymers to metals, film-formation processes in emulsions and lattices, and the development of chemical, biochemical and electro-active sensors.

SMI also has expertise ranging from nanomaterials and nanocharacterisation, through solid mechanics and materials engineering, to large-scale structures and reliability engineering of large infrastructure systems.

The **Division of Chemical Sciences** is a vibrant research community, actively engaged in research that uses synthetic and chemical/surface characterisation techniques. The **Materials and Nanobiology Research Theme** drives the development of materials in bionanotechnology and nanochemistry.

NEXT GENERATION MATERIALS AND CHARACTERISATION

Our campus is home to state-of-the-art characterisation facilities that enable the structure and composition of very thin films to be determined, as well as providing three-dimensional elemental and chemical information.

Samples can also be analysed and stress-tested on the macro-, micro- and nano-scales. We invest in the very latest process capabilities, housed in a clean-room environment, which can take samples ranging from a few millimetres to six-inch wafers.

Our electrical and optical characterisation facilities allow measurements to be taken at both normal and elevated temperatures and pressures. We also use laser and ultra-fast laser laboratories and advanced nuclear magnetic resonance techniques.

Our EPSRC-funded materials research has generated 56 patents and licences, and contributed to successful spin-outs such as Si-Light Technologies. Further company spin-outs involving hydrogen-based fuel cells and novel materials technology are planned.

INDUSTRY RECOMMENDATIONS

A range of stakeholders from academia and industry work with us through the KTA to develop and exploit our EPSRC-funded research. Here, four of our partners explain the benefits of their collaboration with us.

Susan Evans
Programmes Director, National Physical Laboratory

Working with the University of Surrey through the KTA has provided significant opportunities to enhance our partnership with them. With the valuable support of the KTA's mechanisms for funding and exchange of personnel, we have accelerated the exploitation of our complementary knowledge bases and capabilities.

Surrey's refreshingly progressive perspective on exploitation of University research combines with NPL's experience of best practice in knowledge transfer activities to produce a powerful partnership. The result is a real boost to UK industry's take-up of EPSRC-funded research outputs.

Dr Martin Kemp
Theme Manager, NanoKTN

The nanotechnology field is still largely uncharted territory, so companies need assistance to try out innovative new ideas. This help can come from universities and research organisations, but finding a 'way in' to meet the right experts can be daunting, especially for SMEs with limited resources.

Formal means for developing relationships between industry and universities – such as the KTA – offer a fast-track route to realising the significant benefits that nanotechnology can bring to many UK industries, gaining competitive advantage and market share.

The KTA-funded BlueSkyNano/University of Surrey awards scheme that we are involved with acts as an easy, SME-friendly way for companies to get help from academic and research organisations to improve and develop their products.

Mr George Saleh
Consultant Ophthalmic and Oculoplastic Surgeon,
Moorfields Eye Hospital Bedford

Our work with Surrey via their KTA has been an extremely successful collaboration that has allowed us to make very significant progress with targeted software development for the automated detection of diabetic retinopathy, a potentially blinding condition.

Increasing patient volume is putting the existing manual grading systems under ever greater pressure, so automated evaluation of retinal images is the prime potential solution. The KTA grant has allowed us to make significant progress through the next phase of development and testing of our software. Building on several successful years of research, this funding has allowed the software to be applied to a wide-scale data set of several hundred images. This will allow for a formal clinical study to be performed and the feedback will augment further programming to enhance the system. This has the potential to impact very significantly on the diabetic population, allowing faster and wider access to screening which could expedite referral for sightsaving treatment.

Professor Peter Dobson
Chair of the Nanotechnology and Photonics Advisory Group
Academic Director of the Oxford University Begbroke Science Park

As the advisor on nanotechnology to Research Councils UK (RCUK), I am delighted to be involved with the University of Surrey KTA and its activities in translating the fruits of research into industrial applications, which are central to the aspirations of the Research Councils and UK industry.

These knowledge transfer initiatives will change the way in which universities and industry work together, and create new jobs and opportunities.

88%

of the University's research was rated world-class
or of international quality in the Government's 2008 Research Assessment Exercise.

THE KTA TEAM

To help you make the best of our research via the Knowledge Transfer Account, we have Academic Leads and Knowledge Exchange Directors in each of our three main technology areas. The Academic Leads are are responsible for driving the development of each Platform, while the Knowledge Exchange Directors are professionals in their field whose primary focus is to connect external parties with our research. They encourage, investigate and advise on potential projects, as well as overseeing collaborations between partners and research staff.

We also have a team of staff within the Research and Enterprise Support unit (RES) who perform defined roles within the programme. With this combination of academic and supporting staff, we can make sure that you find the people you need to meet, and keep your partnership project on course for success.

Professor Barry Evans

Academic Lead

Professor Evans is a member of the Centre for Communication Systems Research, and was formerly Director and Pro-Vice-Chancellor for Research and Enterprise. His work is internationally respected in the satellite communications field.

As well as setting up Surrey's MSc Communications Networks and Software programme, he has also organised the Institute of Engineering and Technology (IET) and University of Surrey short courses in Satellite Communications Engineering.

Barry is author of the IET book on satellite communication systems, and editor of the International Journal of Satellite Communications and Networking. His research in the field spans modulation and coding, propagation, satellite networking and on-board systems.

He was a founder member of the UK Mobile Virtual Centre of Excellence and has been involved in mobile and satellite communications research for over 30 years.

He is a member of OFCOM's spectrum Advisory Board and has also served on MoD, EPSRC, Hefce and BNSC boards. He is a director of Mulsys, a University spin-out company.

Peter Lancaster

Knowledge Exchange Director

Peter Lancaster moved into technical support and training after many years in electronic controls system design in a variety of industries, including managing the European technical support department of a major electronic test equipment company.

For the past three years he has worked to bring industry and universities closer together, originally on a regional basis in the southwest, then nationally with the Digital Systems KTN, and now with us at the University of Surrey.

Peter has an MSc in Science Communication and is employed by NPL in their Knowledge Services Division.

> "Together, the IT and Telecoms industries, contribute 4.9% to total UK GVA.

COMMUNICATIONS AND SIGNAL PROCESSING

THE KTA TEAM

NANOTECHNOLOGY AND PHOTONICS

Professor Ravi Silva
Academic Lead

Professor Silva (FREng) is Director of the Advanced Technology Institute (ATI) at the University of Surrey. He has made more than 350 presentations at international conferences, published over 330 journal papers, and his inventions have led to the granting of 20 patents.

He has recently concluded one of the most successful Portfolio Partnership awards with the Engineering and Physical Sciences Research Council (EPSRC) on integrated electronics, worth £6.68m, and at present is working closely with E.On on fourth-generation hybrid solar cells for large area deployment.

Ravi is working with the Royal Academy of Engineering (of which he is a Fellow) and colleagues in India on the large-scale deployment of solar technologies in that country. He has won the Albert Einstein Silver Medal from UNESCO, the Charles-Vernon-Boys Medal from the Institute of Physics, and the IEE Achievement Medal from the Institute of Engineering and Technology.

He was shortlisted for the Academic Enterprise Awards (ACES) 2009 in Europe for industrial contributions to semiconductors.

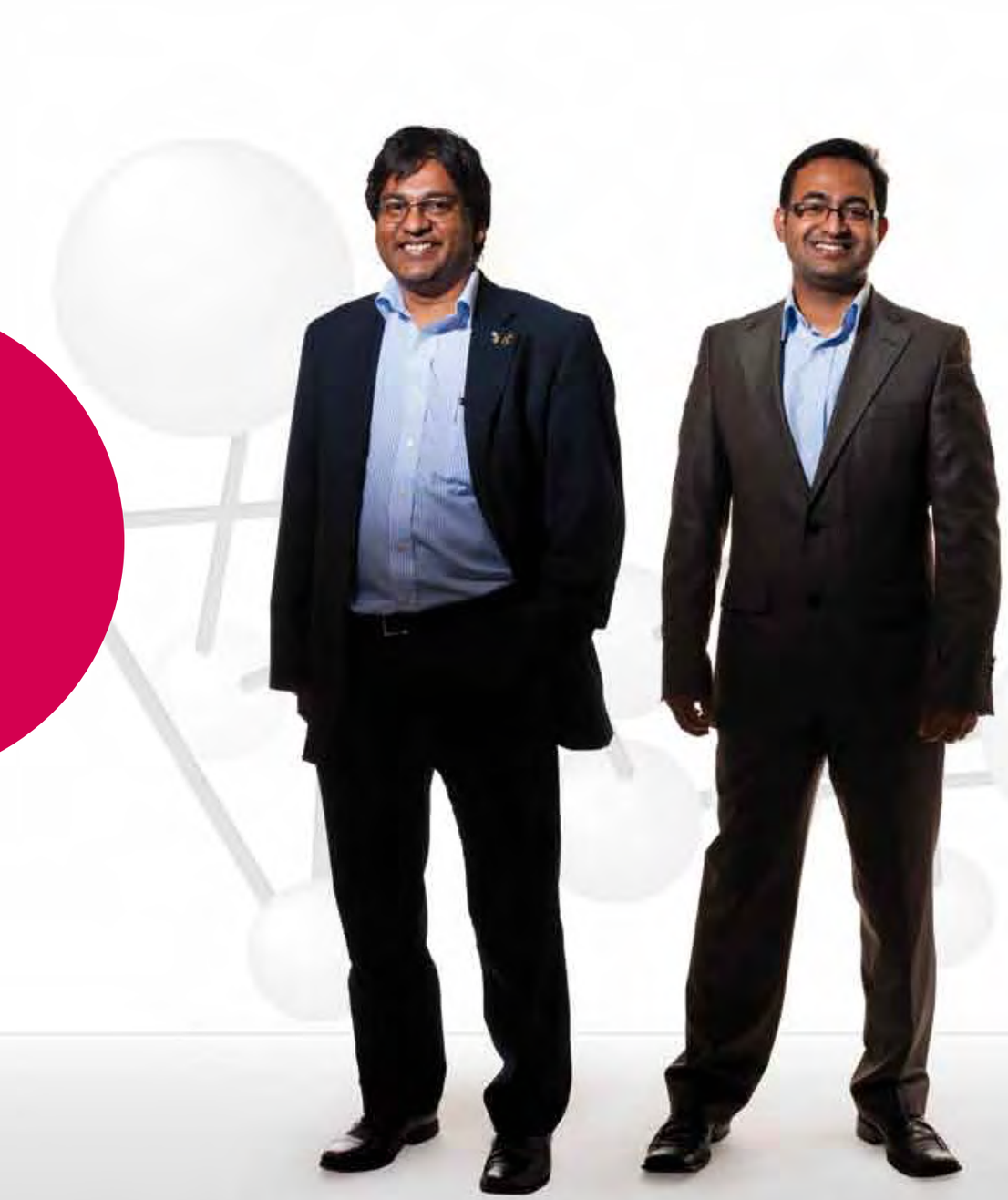
Tiju Joseph
Knowledge Exchange Director

Tiju joined the Surrey KTA from NPL, where he also leads the Sensors and Instrumentation KTN's work in micro and nanosensors, and established a fast-growing industrial community in this area.

He graduated from the University of London with an MSc in Nanotechnology, and has an MBA from the University of Strathclyde focusing on entrepreneurship and strategy management. Previously he worked with the Institute of Nanotechnology, where he was a Senior Technology Analyst, and has developed and co-ordinated several micro and nanotechnology networks.

Tiju has extensive experience of micro and nanotechnology, having provided technology and market analysis on emerging technologies, researched business support systems in Europe for SMEs/start-ups, and reported on new micro and nanotechnology applications. He has excellent links with the micro and nanotechnology community in Europe and beyond, and has worked in various European Framework projects.

> There are more than 1400 companies in the UK operating in nanotechnology, many of which are university spin-outs.



THE KTA TEAM

Professor Karen Kirkby
Academic Lead

Professor Kirkby is Director of the Graduate School in Surrey's Faculty of Engineering and Physical Sciences, which has around 700 doctoral researchers.

She is also Director of Science for the Surrey Ion Beam Centre (IBC), a National Facility sponsored by the EPSRC, where her innovative work has helped push the use of ion beams into new territories such as cancer research, microprocessors and criminal forensics. She has also served as a technical expert for the International Atomic Energy Agency (IAEA).

Karen has published over 170 papers in refereed journals, including *Nature*, and has presented more than 130 papers at international conferences, many as an invited speaker. She has also written for popular science magazines such as *New Scientist* and her work has been featured in *The Guardian* and a number of TV programmes. She is also grant holder for research projects valued in excess of £15 million (from EPSRC, Wolfson Foundation and the EU).

Bevan McWilliam
Knowledge Exchange Director

Bevan is a graduate of the University of Otago, New Zealand, with a BSc (Hons) in Microbiology with Biochemistry, and also has an MBA from Victoria University of Wellington.

Bevan is the newest member of the KTA team, having joined in late 2010 following three years with the Natural Environment Research Council (NERC). There, he was responsible for scouting new commercial opportunities and liaising with industry and local government to develop business cases and IP strategies for science and technology funding initiatives.

In total, Bevan has over seven years' knowledge exchange and commercialisation experience, and with his substantial international network throughout academia, he is a valued addition to the team.

> "The TSB has identified advanced materials as a key technology area with global market potential for the UK economy.

NEXT GENERATION MATERIALS AND CHARACTERISATION

THE KTA TEAM

Paul Roberts
Research Development Manager

Paul is the operational lead for the Knowledge Transfer Account.

A graduate of the University of Warwick and Central Connecticut State University, he supports the Deputy Vice-Chancellor Research and Innovation in the communication and implementation of the University's research strategy.

Having joined RES in December 2007, he currently leads the Research and Knowledge Transfer support teams. Prior to 2007, he worked as a project manager within the University's Executive Office, covering University-wide initiatives such as the 2008 Research Assessment Exercise.

Sophie Woodward
KTA Project Manager

Sophie ensures that the KTA programme runs smoothly and raises awareness of its activities both within our academic community and externally with regional and national organisations.

She graduated from the University's School of Management in 2004, and worked in the central HR department before moving to project management in RES in 2006. She has managed a variety of projects, covering subject matters such as management and leadership, knowledge networks, medical strategy and space research.

Following a move to Dundee, where she project-managed local authority strategic planning, Sophie returned to Surrey to take up her current role with us as KTA Project Manager.

Octavia Beer
KTA Project Officer

Octavia supports the operational management of the KTA and works closely with the KTA Project Manager to achieve the aims of the programme.

Octavia graduated from the University of Winchester in 2005 and subsequently worked for Legal and General in coordinating and facilitating the work of more than 100 financial advisors.

Octavia joined RES in July 2009 and began working on the KTA in August 2010.

> "The Surrey KTA provides investment to develop key technologies and is delivering a step change in research exploitation.

OPERATIONAL TEAM

LOOKING AHEAD

The Surrey KTA has had an impressive first year, and there is every reason to expect continuing success. But that won't just happen on its own.

Our challenge is to expand the KTA while remaining focused on its goals. We must widen engagement with our EPSRC-funded research, and really push potential partners to exploit the knowledge we are offering to share.

We must continue to demonstrate how application of our world-class expertise improves businesses, profits, jobs and lives. We must continue helping those outside academia to understand the quantifiable value of investing in good research, both for individual organisations and society as a whole.

To do this, we need to be even bolder and more innovative in the ways we share our knowledge. We must re-examine existing forms of knowledge transfer and, where they are no longer satisfactory, we must move in new directions.

The KTA team cannot do all this on our own, so we are extending the challenge to our entire academic community.

In 2011, a new e-learning module on knowledge transfer will be made available to our researchers and academics. Through this module, we will encourage even more expert engagement with the KTA and help initiate the spark of new ideas.

Our colleagues across the University are already drafting new proposals with this in mind. For example, we are building on multidisciplinary research in digital ecosystems (including ICT, sociology and psychology) to develop an innovative multimedia e-learning facility for local SMEs. This will allow us to engage more closely with even more businesses who would benefit from working with us.

This is just one of the ways we will step up the sharing of our knowledge in order to encourage collaborative working and spur demand-driven use of resources.

In short, the KTA's future presents a stirring challenge studded with opportunities to make an impact with our research. We are confident that we can rise to that challenge, and we look forward to ever better knowledge-sharing with partner organisations both current and new.

27 projects

were funded by the KTA in its first year, including four Knowledge Transfer Partnerships.

$1 trillion by 2015

The American National Science Foundation has predicted that nanotechnology will be a $1 trillion global market by 2015.

> "We must continue to demonstrate how application of our world-class expertise improves businesses, profits, jobs and lives.

OTHER WAYS TO SHARE OUR KNOWLEDGE

Surrey's Knowledge Transfer Account is one flexible way of working with us to exploit our world-leading research, but we also have other programmes that can help your organisation get involved with us.

Knowledge Transfer Partnerships

We have an active and diverse portfolio of Knowledge Transfer Partnerships (KTP), a flagship government-funded programme which has been running nationally for over 30 years.

KTPs encourage the transfer of skills and knowledge within a particular field, typically via a partnership between a company and an academic institution. Businesses throughout the UK have reaped considerable rewards through participation in University of Surrey KTP projects, and our programmes in science and technology have gained further recognition as a result.

For more information on Knowledge Transfer Partnerships, and to find out how you can benefit from working with us, please see our Business webpages:

www.surrey.ac.uk/business

Industrial Doctorate Centres at Surrey

Industrial Doctorate Centres (IDCs) provide a supportive and exciting environment in which postgraduate students (or 'Research Engineers' as they are known within the programme) can gain an Engineering Doctorate (EngD).

These are four-year research degrees – academically equivalent to a PhD – in which a Research Engineer carries out challenging research projects in close collaboration with an industrial sponsor organisation, with mutual benefits for each.

In 2009, the Engineering and Physical Sciences Research Council (EPSRC) awarded us a £12m grant to launch two prestigious IDCs. With only 19 such centres in existence, this was a significant boost to the University's prestige and gives us another tool in our quest to pair research excellence with tangible results.

Our two IDCs are:

MiNMaT Industrial Doctorate Centre

In materials science and engineering, the relationships between processing, microstructure and properties are of fundamental importance. MiNMaT is at the forefront of developments in micro- and nano-materials and technologies.

SEES Industrial Doctorate Centre

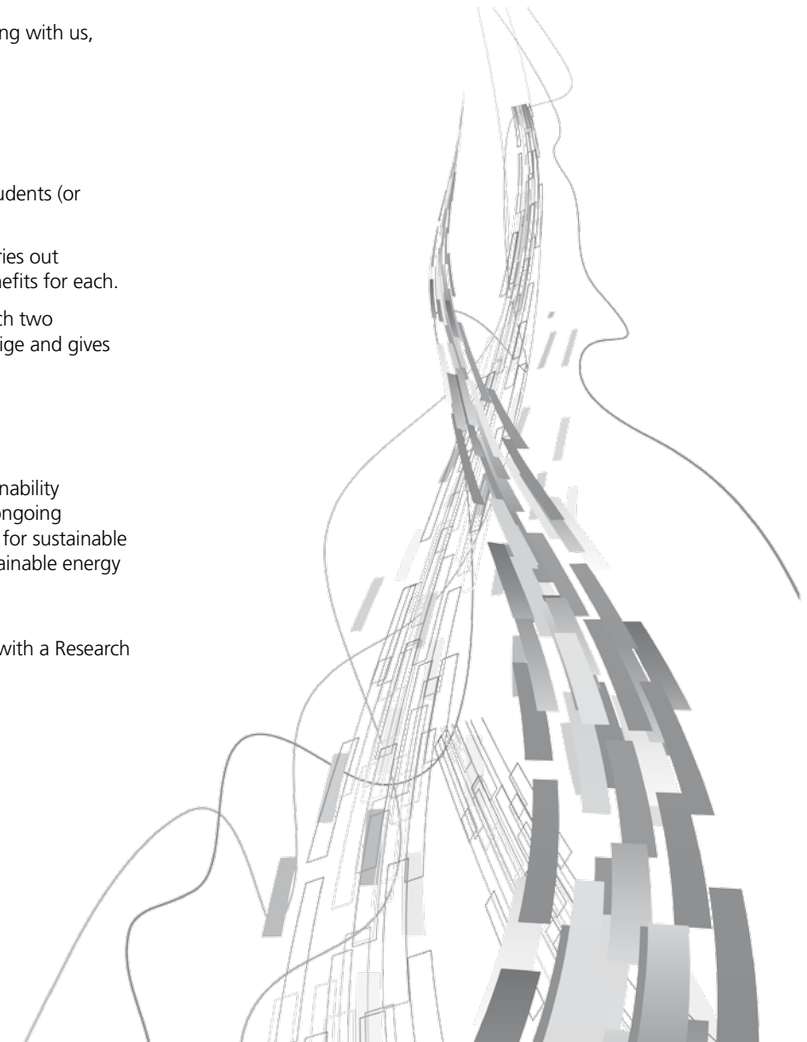
Research carried out at SEES improves sustainability for engineering and energy solutions, with ongoing programmes in three key areas: engineering for sustainable development; systems approaches; and sustainable energy and low-carbon systems.

For more information on our IDCs, and to find out how your organisation could benefit from collaborating with a Research Engineer, please visit our Industrial Doctorate Centre webpages:

www.surrey.ac.uk/feps/study/pgr/idc

The **Centre for Communication Systems Research (CCSR)** is the UK's largest academic communications research centre, managing a research portfolio of

£12m



CONTACT US

We welcome the opportunity to engage in new collaborations and partnerships via our Knowledge Transfer Account.

If you have a challenging problem that needs an innovative solution, or you want to discuss ways of getting our skills, resources and technologies working for your business, please contact the Knowledge Exchange (KE) Director for the Platform area best suited to your organisation's needs:

Communications and Signal Processing

KE Director:

Peter Lancaster

T: +44 (0)7738 895464

E: peter.lancaster@npl.co.uk

Nanotechnology and Photonics

KE Director:

Tiju Joseph

T: +44 (0)7738 895577

E: tiju.joseph@npl.co.uk

Next Generation Materials and Characterisation

KE Director:

Bevan McWilliam

T: +44 (0)7547 154407

E: bevan.mcwilliam@npl.co.uk

Or for general enquiries about the programme, please contact:

KTA Project Manager

Sophie Woodward

T: +44 (0)1483 686434

E: s.woodward@surrey.ac.uk

If you would like more information about our KTA, please visit our webpages:

www.surrey.ac.uk/kta

For more information on any of our KTA Platforms, please contact the relevant Knowledge Exchange (KE) Director.

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National Physical Laboratory

Engineering and Physical Sciences Research Council

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