

KTP case studies

Bringing knowledge and expertise to your business every day, a KTP project is a three way partnership between your organisation, the University and a high-calibre graduate. The project can last from between six months and three years. Below are some examples of KTP projects with the University of Birmingham.



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Housing Associations' Charitable Trust (HACT)

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The **Housing Associations' Charitable Trust** (<http://www.hact.org.uk/>) (HACT) was established in 1960 as a national charity seeking to support the work of housing providers and influence housing practice, primarily in the housing association sector. The charity re-launched in 2012, reinventing itself as an ideas and innovation agency for the social housing sector, operating on a social enterprise-based model.

The reason for this change was due to the changing operating environment for both HACT and the sector it worked with. HACT's original funding model, which was primarily grant-driven, had ceased to provide a viable source of income and was – increasingly - diverting the company's attention from its core historic work with affordable housing providers. Furthermore, whilst in the past housing providers had benefited from HACT's grant funded activity, housing providers were now capable of funding their own activities, and the more urgent demands were around the generation of ideas and innovative practice. A decision was therefore made to move to a sustainable knowledge-based business model, but HACT required academic expertise to develop services that would be beneficial to its target market.

Working with **Professor David Mullins** (<http://www.birmingham.ac.uk/schools/social-policy/staff/profile.aspx?ReferenceId=20451>) and **Angus McCabe** (<http://www.birmingham.ac.uk/schools/social-policy/staff/profile.aspx?ReferenceId=4731>) of the University of Birmingham, funding from Innovate UK (formerly known as the Technology Strategy Board) allowed an honorary fellow from the University, **Dr Tricia Jones** (<http://www.birmingham.ac.uk/generic/tsrc/about/Staff-profiles/tricia-jones.aspx>), to be based with HACT for 2 years. During this time Dr Jones oversaw a project that helped HACT deliver a huge transformation to reflect the equally large changes taking place in its housing-centred marketplace, investigating and developing new opportunities as they arose, with a particular focus on identifying and developing innovative insight and learning from across the social housing sector and beyond. As a result, HACT is now able to translate social science based research into marketable learning packages and disseminate learning with the Housing and Communities Research Group at the University of Birmingham. They have created a new role of Research Manager and annual sales turnover has seen an increase of over £600k as a direct result of the KTP project.

"The KTP was instrumental in enabling HACT to transform its business... Our partnership with the University of Birmingham and its Third Sector Research Centre has positioned HACT as the market leader for creating new knowledge sharing platforms and new insights for social housing providers." – Andrew van Doorn - Deputy Chief Executive, HACT

Touchlight Genetics Ltd (TLG) - The future of vaccines

Touchlight Genetics Ltd (TLG) is at the forefront of the development of innovative DNA-based medicines for the treatment of both human and animal diseases. The Company has also developed an effective drug delivery system. These DNA-based drugs have the potential to revolutionise healthcare provision.

Working with researchers at the University of Birmingham's School of Biosciences, led by Professor Jeff Cole, the Company has now embarked on a Knowledge Transfer Partnership (KTP) project that will develop the cloning and expression of DNA metabolising enzymes to enhance the biosynthesis of novel DNA vaccines. The TLG technology is unique in generating vaccines uncontaminated with unwanted DNA sequences.

TLG have developed a process for synthesising DNA to be used in healthcare, and are developing in-house equipment to scale up production. Their process requires two enzymes, only one of which is currently produced in-house. Expertise in Birmingham will be exploited to produce and purify commercially useful quantities of the second enzyme and is critical to successful completion of the KTP. This partnership with the University of Birmingham will give TLG opportunities to commercialise their research by generating products of critical importance to healthcare and the UK economy.

Successful delivery of this project will significantly extend the range of products TLG can market thus leading to the creation of new jobs.

'It is important for our experts to share knowledge with academic experts, particularly when a company has the ambition to revolutionise the established field of vaccines and to bring new drugs to the market. We are enjoying the participation of our KTP Associate in our laboratory, and we hope that both entities will benefit from the experience.'

Jonny Ohlson, CEO, Touchlight Genetics Ltd

Prime plc - Building a stronger knowledge base

Prime is a property development and investment company that fund, design, construct and maintain health-service related buildings. They have a diverse set of clients ranging from GPs, community healthcare providers and Local Authority partners.

One of the main challenges that Prime faced was the lack of systematic knowledge management across the organisation and subsequent access to robust, evidence-based data on its performance and its products. This meant that new business was harder to win and there were delays and duplication in progressing existing projects. These issues had a commercial impact on Prime because it was missing out on the income from potential new business and experiencing the additional cost that delay and duplication inevitably incurs.

A Knowledge Transfer Partnership (KTP) with the University of Birmingham helped the Company to develop the in-house knowledge and the skills it required. The aim was to develop processes for collecting information and a database to store data that would enable easier retrieval and analysis.

Working with Hilary Brown from the University's School of Social Policy, Prime created an effective Prime Facts database and robust knowledge management processes. This in turn has led to a more evaluative culture within the organisation.

'Working with the University of Birmingham on this KTP project has been invaluable in supporting our business strategy and objectives going forward. Having a dedicated University of Birmingham (KTP) associate on site has enabled us to focus on delivering the project on time and on budget.'

Ann Pursey, Group Partnerships Director, Prime plc

Paraytec Ltd - Measuring the flow

Paraytec is a UK based scientific instrument company manufacturing and distributing a range of products for pharmaceutical and biopharmaceutical applications.

They are constantly striving to build further capability into their instruments and one of the key problems they were facing was how to characterise the key attributes of biotherapeutic proteins whilst using extremely small volumes (10 microlitres or less) of what is a very high value material.

Usually the proteins are injected into, and driven by pressure, through a capillary, and their concentration profiles visualised at two windows. Analysis of these profiles yields some information about protein size and solution viscosity. Further development of the analysis techniques and application of mathematical modelling was expected to significantly improve the efficiency of measurements.

Working with researchers from the University's School of Mathematics, led by Dr Jamal Uddin, the Company embarked on a KTP project which established a theoretical framework for the modelling of concentration-dependent effects under the flow conditions relevant to Paraytec's TDA200 instrument. The model provided a theoretical basis from which the extraction of concentration dependent parameters can be achieved.

"We are delighted with the outcome of the project. We now have a sound theoretical model upon which to build further capability into our instrumentation. We have very much enjoyed working with the University of Birmingham and would recommend the shorter KTP approach to other companies."

Professor David Goodall, CSO, Paraytec Ltd

Atkins Rail - A model railway system

A Knowledge Transfer Partnership (KTP) between the University of Birmingham and Atkins is developing a multi-train railway simulator (MTS) to provide the capability for advanced simulation work that addresses future sustainability, carbon and legislative issues.

Atkins is a major consultancy company that provides knowledge, application, innovation and expertise to the rail industry across many rail engineering and non-engineering disciplines. The Company needed to develop its own software simulation tools for use in modelling AC/DC railway infrastructure as the existing commercial modelling tools available do not allow access to the source code, and therefore, provide very little control on the solution methods used.

Working with Professor Clive Roberts and Drs Stuart Hillmansen and Paul Weston from the University of Birmingham's Centre for Railway Research and Education the collaboration aims to provide Atkins with the capability to develop the required skills and competencies to develop a MTS and to keep it continually up-to-date. In particular, the KTP project has looked at innovative ways to address the requirements of current electrical safety standards and the need to ensure that new designs take into account carbon critical design. The engineering tool is also being developed with a unique feature which will simulate anticipated operating timetable in a 'real time' manner to assess the performance and behaviour of the operational railway.

'The MTS tool being developed with the University of Birmingham will increase Atkins capability and competitiveness in this area and enable us to offer our clients designs to develop and operate the railway infrastructure that minimise carbon emissions.'

Roger White, Professional Head of Electrification and Plant for Atkins Rail Division

The Supplies Group (TSG) - Happy Shopper?

The Supplies Group (TSG), an internet retailer, acquires all its customers through online marketing, mostly at a financial loss, with the hope of selling other products to them in the future. As the Company did not know, or understand, the profile of the most valuable customers they felt that the return on their investment in customer acquisition and retention was not being maximised.

Working with researchers from the University's School of Computer Sciences, led by Dr Peter Tino, the Company embarked on a KTP project which developed methods to represent customers based on patterns of historical sales data and to predict their Life Time Value (LTV).

Algorithms were developed to identify the most important product families with the potential to indicate customers with high future profitability.

The KTP has had considerable impact with TSG having recruited 3 postgraduates from the University to take forward, and build on, the results of the project, and an expectation that a further 3 posts will be created. Furthermore TSG is predicting a £2.5M pa increase in customer acquisition revenue and a 15% increase in existing customer LTV which will contribute to an additional £2M of potential annual revenue growth. A further two EPSRC (Engineering and Physical Sciences Research Council) funded projects have also evolved from this project.

"The project outputs will give TSG a tangible competitive advantage in online customer acquisition efforts. The work will allow us to identify customers of high value and target our marketing budget to maximise acquisition of such customer groups while minimising exposure to low value customers."

Noah Gresham, The Supplies Group

Birmingham City Council - Keeping Birmingham cool

A Knowledge Transfer Partnership (KTP) between the University of Birmingham and Birmingham City Council is helping to provide the necessary evidence to ensure the effective delivery of the Council's long term vision that the City 'will be the UK's first sustainable global city with a low-carbon energy infrastructure and well prepared for the impact of climate change'. The KTP will seek to quantify for the first time the combined impact of the 'Urban heat island' and climate change up to 2100 in Birmingham.

Urban heat island is the term used to describe the phenomenon of higher night time temperature levels being recorded in metropolitan areas than those that are recorded in rural areas. This is mainly due to the fact that the building materials used in urban areas retain heat gained during the day and release it slowly at night. Observations of the heat island in Birmingham show that on some nights temperatures in the city can be 8°C higher, much stronger than the usual 1 or 2°C. This can put considerable heat stress on the built infrastructure and on individuals living in a city that has already experienced extreme weather events such as thunderstorms and tornadoes.

Cllr Paul Tilsley, Deputy Leader of Birmingham City Council, said: *"The 2003 heatwave saw temperatures top 38.5°C nationally, which caused over 2,000 excess deaths in the UK. Research suggests these could be average summer temperatures by 2040 as our climate continues to warm and extreme weather becomes more frequent and intense - so we need to understand how future weather events will affect people's health and the city's infrastructure, which is exactly what this project will enable us to do."*

Surprisingly the latest national climate change scenarios that are available do not take into account the urban heat island effect. Working with Professor John Thornes, Dr Xiaming Cai and Dr Lee Chapman in the School of Geography, Earth and Environmental Sciences at the University of Birmingham the KTP will seek to fill this gap. Existing climate modelling skills and expertise residing at the University will be transferred to the City Council via an easy to use climate change adaptation planning tool called the BUCCANEER (Birmingham Urban Climate Change Adaptation with Neighbourhood Estimates of Environmental Risk).

"The project will certainly put Birmingham at the forefront of research into understanding the impact of climate change at a neighbourhood level in cities. It will provide vital information for a range of Council services in the City as well as being key to the effective adaptive responses of Birmingham City Council partners, in particular the NHS."

Sandy Taylor at Birmingham City Council

BT - Your call is important

A Knowledge Transfer Partnership (KTP) between the University of Birmingham and BT is helping the Company to advance the monitoring capabilities of its communication procedures with a view to transforming its service delivery systems.

BT is one of the world's leading providers of communications solutions serving customers in Europe, America and Asia Pacific. Its principal activities include networked IT services, local, national and international telecommunications services, and higher-value broadband products and services. BT serves over 18 million business and residential customers, and provides network services to other licensed operators.

Under Dr Behzad Bordbar, Lecturer in the School of Computer Science at the University of Birmingham, the partnership seeks to design and implement a distributed system for performance and compliance monitoring in BT's service oriented computer structures.

Professor Ben Azvine, Head of Security Research at BT said: *"The KTP with the University of Birmingham will help us to deal with faults and problems in near real-time and identify root causes to problems so that we can avoid recurrences in the future. This will enhance our competitiveness in the market and consolidate our role as an innovative leader in the industry."*

E.ON - Keeping on the lights

A Knowledge Transfer Partnership (KTP) between the University of Birmingham and Central Networks is helping the energy company to devise an effective asset-replacement strategy, adapt to climate change and provide a reliable ongoing service.

Central Networks, which is part of the E.ON group, distributes energy to 10m people in central England through 133,000km of underground and overhead cables and via almost 94,000 substations.

Over 4,500 of these substation sites are in the Birmingham area, many of which contain transformers that were installed over 40 years ago.

If scientists can understand the various scenarios relating to climate change, including the effects of 'urban heat islands' (metropolitan areas which are significantly warmer than their surroundings), they can calculate the life cycles of Central Networks' transformers and come up with the best possible asset-replacement strategy.

Under Dr Lee Chapman and Professor John Thornes in the School of Geography, Earth and Environmental Sciences, the partnership seeks to investigate the relationship between weather conditions and asset temperatures. Once these relationships are known, projections can be made for various climate scenarios so that asset life cycles can be approximated.

Robert Ferris, Innovation and Development Manager for Central Networks said: *"The KTP with the University of Birmingham should make a strong contribution to our future asset replacement strategy. Allowing Central Networks to determine how best to adapt to climate change impacts in urban areas will enable us to continue to provide a reliable network for our customers."*

Drywite Ltd - A KTP

Drywite, a small family owned business, have been manufacturing vegetable preparations to catering and vegetable industries since 1933.

Their main product is sulphite based and over the years has developed strong UK and export markets. However, the increasing trend is for organic non-sulphite products, so in order to retain their position in the marketplace they required expert help to enable them to develop a sulphite free solution that would be effective and economical to use.

Most fresh fruits and vegetables have a pronounced tendency to discolour to a greyish-brown after periods of storage producing an appearance that is unacceptable to consumers. The main focus of academic work carried out has been on enzymatic browning, one of the primary reactions responsible for such discolouration.

The University of Birmingham has the largest chemical engineering-based food research group in the UK, incorporating research into structured foods, flavour delivery and food hygiene. The University was therefore ideally placed to help, and is now working with Drywite under the Knowledge Transfer Partnership (KTP) scheme. The KTP project will develop a chemical route to provide a six day shelf life for peeled potatoes. The challenge will be to come up with a solution that uses environmentally acceptable chemicals, retains key product characteristics such as colour, and can be implemented in a commercial operation.

"We are grateful...to use the expertise of Dr Tony Hasting and the resources of the University of Birmingham for a project that our company may not otherwise have been able to afford. We were very happy with the report that Dr Hasting produced and would like to continue to develop links with universities."

Kelvin Lee, Managing Director, Drywite Ltd

Cogitare Ltd - A train of thought

Cogitare Ltd (<http://www.cogitare.biz>) a niche consultancy serving many clients in the rail sector. Their core business is the sale of solutions for the optimisation of rail infrastructure and operations. Indeed, Cogitare's 'Systems Optimisation Process' helped London Underground reduce whole-life system costs by almost £0.5 billion and saved 5 billion kW hours of energy.

The costs associated with the building of new rail infrastructure are vast and to remain competitive Cogitare wanted to develop better and more economical methods to measure and model 'real' rail capacity and to validate and improve capacity simulations and simulators. The Company looked to researchers at the University of Birmingham's **Centre for Railway Research and Education (<http://www.birmingham.ac.uk/research/activity/railway/index.aspx>)**, led by Professor Clive Roberts and Dr. Stuart Hillmansen for help to explore this opportunity. Cogitare has now embarked on a Knowledge Transfer Partnership (KTP) project with the University that will seek to develop a more sophisticated and accurate measurement and modelling solution.

Successful delivery of the partnership will significantly enhance both partners reputation as technological leaders in the field. It will enable Cogitare to gain access to the University of Birmingham's cutting edge knowledge, capacity and skills in rail capacity simulation and traffic management and in turn the University researchers will benefit from applying their research into a real life situation.

In addition, Cogitare will be introduced to a number of international partners through working in collaboration with the University in its newly formed Chinese Railway Research Institute, the Anhui-Birmingham International Research Institute in Rail Transportation (ABIRIRT). This will help the Company to develop an international network to enhance the sales and marketing of its new products.

Larry Fawcner, Optimisation Director for Cogitare Ltd, said *"by combining the knowledge of our Company with that of the Centre for Railway Research and Education at the University of Birmingham, we believe that we will be able to develop a product that will give us a clear competitive advantage in the UK market. It will also allow us to expand into the Chinese Market."*

Learn more about **Knowledge Transfer Partnerships (<http://www.birmingham.ac.uk/ktp>)** and other **funding opportunities (<http://www.birmingham.ac.uk/partners/partner-with-us/funding-support.aspx>)** that may be available for your Company.

Rolls-Royce - Working together to find a solution

Rolls-Royce generates around half of its revenue from aftermarket services and offers a comprehensive suite of services that cover all aspects of managing and maintaining its engines throughout their lifecycle. This includes the innovative TotalCare® which rewards reliability, a factor valued most highly by customers. By being charged on a \$/engine flying hour basis, TotalCare transfers both time-on-wing and shop visit cost risks back to the original equipment manufacturer, and makes reliability and time on wing a driver for profit for both the customer and Rolls-Royce.

Therefore one area identified for development was a novel interlayer repair process for titanium blade integrated disk (blisk) aerofoils which is a key element in reducing the life cycle of Rolls-Royce components. Coupled with the high cost of each component, meant that the Company were keen to develop and implement an advanced repair process for these parts. The new process would then become an addition to the portfolio of novel joining methods designed to meet the future repair needs for Rolls-Royce.

A Knowledge Transfer Project (KTP) with the University of Birmingham allowed Rolls-Royce to access expertise in a range of properties and analytical techniques at the University's College of Engineering and Physical Sciences. In turn the partnership provided real benefit to the University of Birmingham researchers, led by Dr Moataz Attallah, allowing them to understand the practical challenges related to interlayer repair technologies and exposing them to several new technologies of relevance to their research.

The project employed a 'KTP associate', Silvia Marchisio, who was based at Rolls-Royce and jointly supervised by the Company and a member of the University's academic team. The associate completed four phases of this project delivering an intellectual property map, a summary report on key process variables and a summary technical report on the tooling concept for interlayer repair and its demonstration on a representative component. The technical success and commercial relevance of the project have been demonstrated by Rolls-Royce's continuing commitment to retain Silvia full-time so that she can actively develop the outcomes of the project.

Dr John Forsdike, CEng MIMM, Repair Technology Programmes, Rolls-Royce said *"Working with the University of Birmingham on this KTP has enabled Rolls-Royce to look in detail at a complex technical challenge using a range of techniques and expertise. This has allowed all partners to appreciate the challenges which need to be overcome in order to fully exploit the potential of the process, which in turn will support our manufacturing base."*

The KTP has widened the scope of collaboration between Rolls-Royce and the University of Birmingham with a further two researchers now engaged to extend the understanding of interlayer repair work. This work will largely focus on optimising blade manufacturing processes building a collective understanding of the specific challenges of maturing manufacturing technologies using lab-scale equipment.

