

Research and knowledge exchange are at the heart of Teesside University and are key elements of our institutional mission.

Our research strategy demands excellence and the generation of outputs that will have genuine impact and resonance beyond the academic environment. As Vice-Chancellor, I am pleased to report that our University continues to deliver on this agenda, by continually building on its niche research strengths and reputation against the backdrop of a flourishing and dynamic research culture which is increasingly making a real and valuable contribution to society.

**This report highlights our main areas of research excellence, and showcases some of our work. I am confident that you will see from the quality, variety and scope of the activity in this report, and the key research themes and selected case studies described, that there is research of international and world class standard being undertaken at Teesside.**

Our five Research Institutes, based around Digital Futures; Technology Futures; Social Futures; Design, Culture and the Arts; and Health and Social Care, provide a broad based, multi-disciplinary, stimulating and supportive environment that nurtures the highest quality research and enables researchers of all levels to work within cohesive research communities – from professors and established academics to

early career researchers including PhD students. The Institutes encourage both collaboration within and across disciplines and engagement with a wide range of external partners and stakeholders. In particular, the University enjoys excellent research partnerships with industry, commerce and the public sector and is able to provide support to these partnership activities through its many collaborative research relationships with universities across the world.

Teesside University is wholly committed to continuing to invest in the future growth of both the quantity and quality of our research within our areas of recognised research strength as applied to regional, national and global challenges in business, the community and society as a whole.

Teesside University is increasingly establishing itself as a catalyst for innovation via the delivery of excellent research through collaboration and partnership. I hope you find the report of interest and I would encourage you to consider how we could possibly work with you in the pursuit of research for the benefit of all.



Professor Graham Henderson  
CBE DL  
Vice-Chancellor and  
Chief Executive



## Making a difference through research

**As Deputy Vice-Chancellor for Research and Business Engagement, I am very proud of the culture that we have built here in the past few years. Research at Teesside University, along with teaching and business engagement, is a key element of our overall mission.**

The ambition for our researchers is to help transform society through their research. Our research aims to support economic growth as well as a myriad of other societal benefits. You will see some examples of research in this report that is carried out within our University and the benefits that the work brings to society.

We are carrying out important work on sustainability for the built environment through the development of ICT tools to reduce the carbon footprint and support for the manufacturing and process

sectors. We also carry out work on leadership and organisational change which is applicable to variety of sectors. Teesside has world class research within digital entertainment which will be important in developing the new digital economy. In health, we are part of Fuse which is a Centre for Translational Research in Public Health and is a collaboration of the five North East universities. Fuse is one of five centres of excellence supported by the UK Clinical Research Collaboration. Our work also makes important societal contributions on right-wing extremism and policy issues of crime and worklessness.

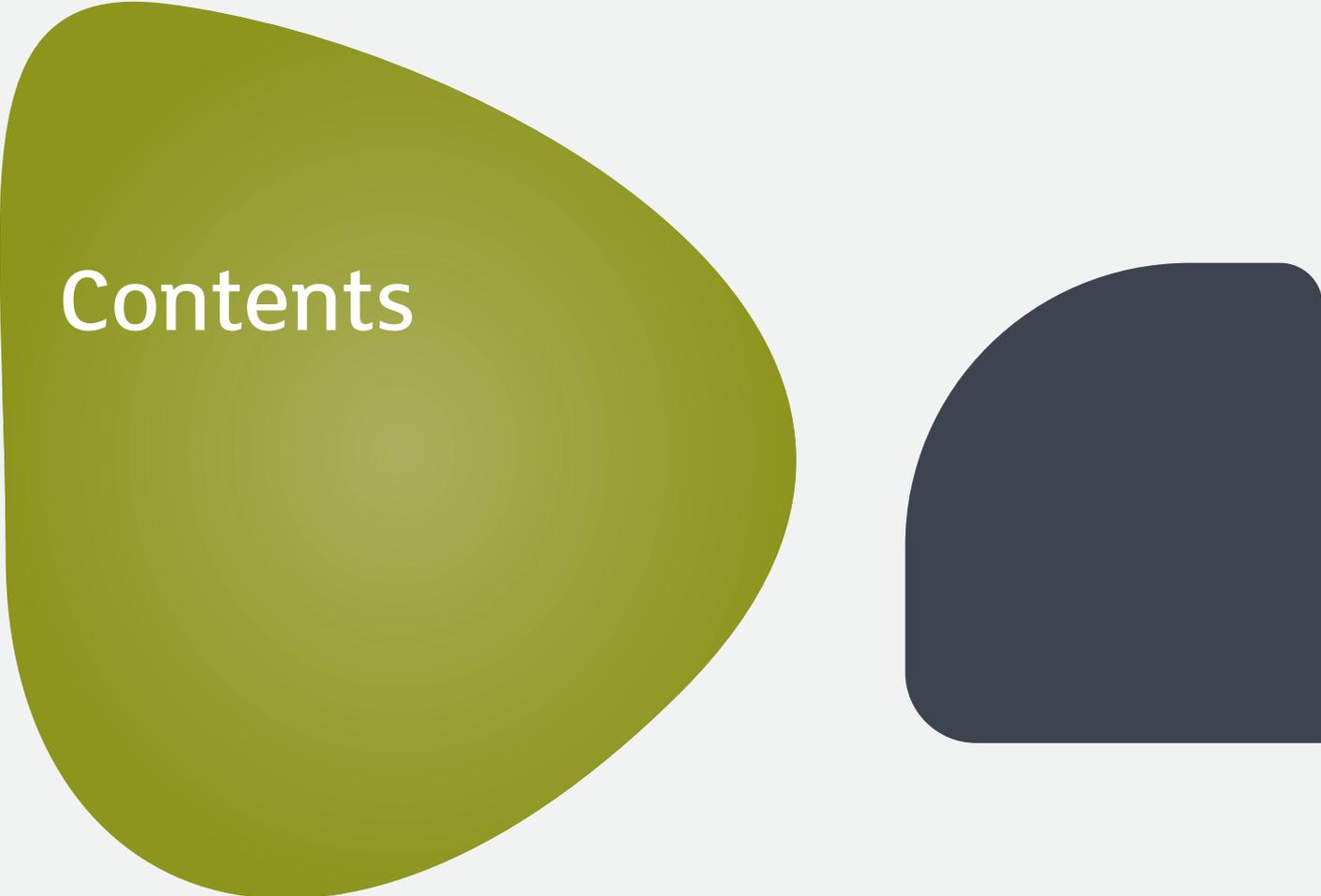
We attach particular importance to the development of different types of collaborations and support these. There is now wide recognition of the need to bring together people from different disciplines

to solve societal challenges and you will see examples of this in our work. We value the opportunities for our academics to participate in knowledge exchange with business partners since this often provides us with opportunities for new research insights. We also recognise that international collaborations lead to high quality research and so we support this. I echo the Vice-Chancellor in encouraging you to consider how we could possibly work with you in the pursuit of research for the benefit of all.

Professor Cliff Hardcastle  
Deputy Vice-Chancellor  
(Research and Business  
Engagement)



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## Research that makes a difference

We are looking forward to working with new and existing partners to continue to develop our research activities, please get in touch if you have a research enquiry:

### Graduate Research School

T: 01642 384438

E: [researchfunding@tees.ac.uk](mailto:researchfunding@tees.ac.uk)

[tees.ac.uk/research/grs](https://tees.ac.uk/research/grs)

[twitter.com/TeesUniResearch](https://twitter.com/TeesUniResearch)

# Digital Futures Institute



Teesside is well known for its computer games programming and computer animation portfolio, and it will come as no surprise that members of the Digital Futures Institute are actively researching the future of digital entertainment. In an industry that is characterised by constant innovation, short product life cycles and a very pragmatic approach, the role of academic research can be seen as a challenge. Yet, we believe that the field leaves open many research questions and offers the possibility of addressing relevant problems without sacrificing technical rigour.

**The main research highlighted in this report is within digital entertainment, more specifically immersive gaming and interactive storytelling. One of the latest trends in digital entertainment has been a renewed interest in 3D displays, and computer games are poised to constitute one of their first applications. With computer games soon to appear in three dimensions, what would be the ultimate game console? How would users take ownership of virtual reality gaming, and which usability issues are attached to it?**

We started to explore the use of game engines to support immersive Virtual Reality back in 2005, as part of the FP5 EU-funded ALTERNE project (co-ordinated by Teesside), and this new technique has since supported the development of our immersive reality platform at Teesside as well as several research projects. However, in the past two years, we have considered porting not just games engines, but entire games based on them, to immersive virtual reality, in an attempt to study how immersive gaming could be the future of digital entertainment.

Interactive storytelling is a research endeavour aiming at reconciling the narrative qualities of film with the interactivity of computer games. Teesside has been active in this area for over 10 years and has achieved an international reputation, leading the only FP7 Network of Excellence on the topic. A typical interactive narrative takes the form of an animation film, whose plot can however be modified in real-time, depending on the viewer's response. There are however

many open questions and challenges on how viewers would interact with the animation feature, ranging from how natural it feels to shout advice at virtual characters, to the sheer difficulties of speech understanding.

Professor Marc Cavazza  
Director

T: 01642 342657  
E: [m.o.cavazza@tees.ac.uk](mailto:m.o.cavazza@tees.ac.uk)



## Key institute themes



### Embodied conversational agents

This is an active area of research whose applications extend from new user interfaces to computer entertainment and e-learning. Generic dialogue models, which have been inspired by task-based transactions, are not always appropriate to the sort of affective communication that should take place between a user and a companion agent. This is why we have developed a novel approach to the generation of conversational utterances, in which a short narrative is generated based on an affective persuasion strategy. This makes it possible to embed friendly advice appropriate to the user's appraisal of their own situation.

### Program analysis/verification

In this area there is a critical need for theoretical study into separation logic. Research has been conducted that aims to combine the power of classical logic and multiplicative intuitionistic linear logic. A theoretically sound framework has been developed for the next-generation separation logic theorem provers for more robust program analysis and verification.

### Crowd modelling and animation

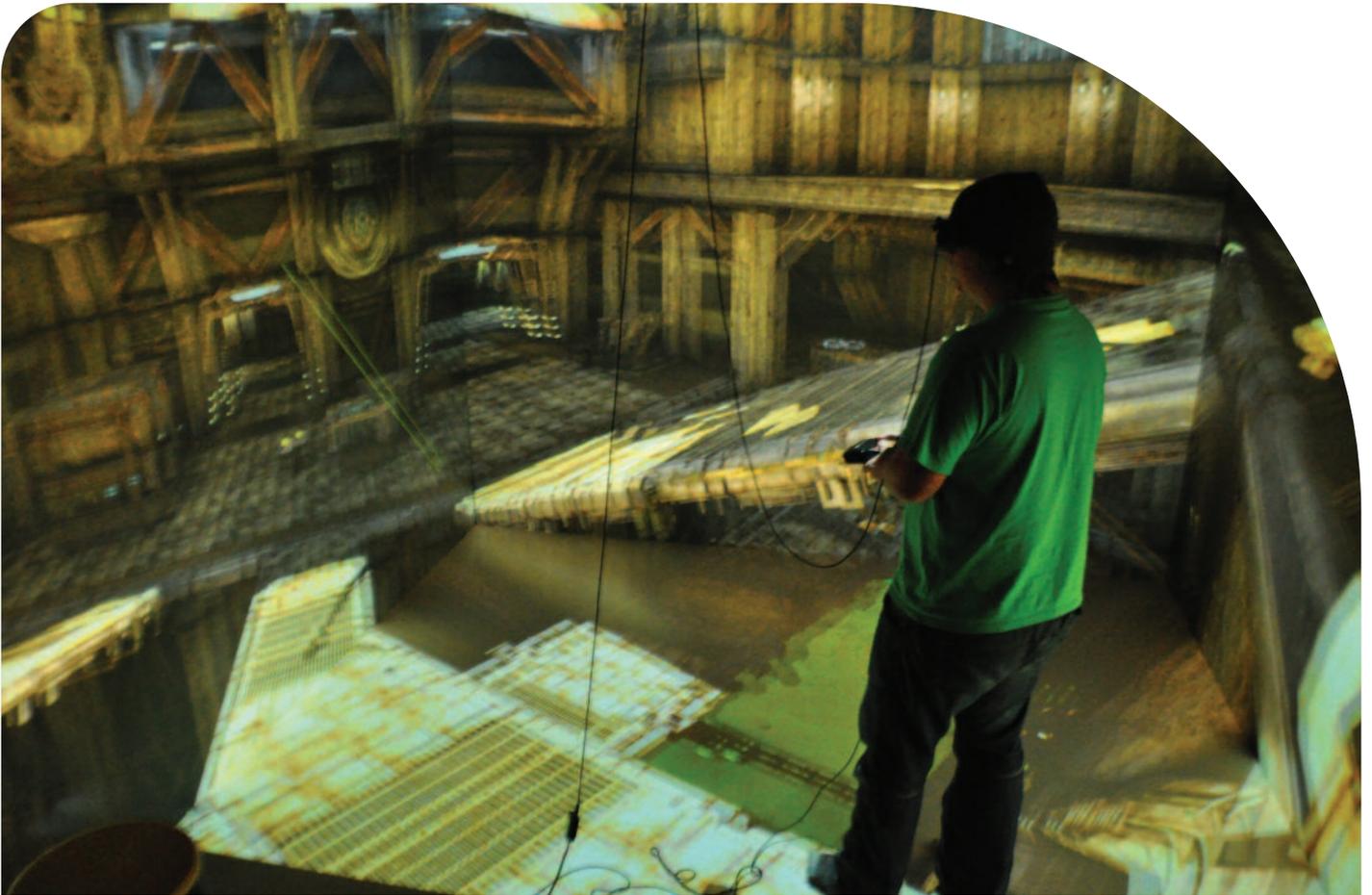
An area with many important applications including computer games, the film industry, building safety analysis, and military training. To generate realistic crowd behaviour, the impact of emotion, culture, and group dynamics requires investigation. In the area of crowd animation, we are particularly interested in enhancing the visual effects of crowd simulation by diversifying the crowd in terms of appearance as well as movement. To this end, we are currently studying the relationship between a character's body shape and its biomechanical locomotive style.

### Inclusive learning environment

To offer a more inclusive learning environment for students with disabilities, a new framework has been studied to support academics in designing and developing accessible and inclusive online e-learning resources. New methods have also been examined that simplifies and improves the efficiency of the editing process of automatically produced lecture transcripts by adopting human computer interaction and natural language processing techniques.

## Case studies

# Immersive gaming



**Our research uses one of the leading games engines, Epic's Unreal Engine, which has been adopted by many development studios worldwide and is at the heart of dozens of blockbuster titles.**

Working in collaboration with Epic Ltd and PublicVR in the USA, we have produced a fully immersive, stereoscopic version of the Unreal Development Kit (UDK) supporting an immersive gaming experience for multiple levels of the game. This was achieved through an innovative middleware, CaveUDK, developed at Teesside by Dr Jean-Luc Lugin. As a result, users can play the

game in a multiscreen environment supporting stereoscopic visualisation of game contents with real-time head tracking, at an average frame rate of 50 frames per second (Figure 1 above).

To study user experience in immersive gaming, we carried out a full-scale experiment with 39 participants, all regular gamers, playing the same game level in its desktop version as well as its Virtual Reality one. During these experiments, we collected objective in-game data (such as players' position and orientation and number of hits), as well as subjective data related to user experience. User expressed a strong

preference for the immersive setting, despite its increased realism making it more difficult to aim at and actually hit opponents. There has been much concern over adverse effects of virtual reality, in particular the occurrence of cyber sickness (which is akin to motion sickness), but our experiments have provided encouraging results also in that regard.

**Figure 1** Immersive gaming: the player is equipped with shutter glasses with head tracking and aims naturally using the game controller as a pointer.

# Interactive storytelling

**This year, a team of Teesside researchers, Drs Gilroy, Porteous and Charles, has achieved a breakthrough in interactive storytelling, by devising an approach in which the system directly reacts to the viewer's emotional state, detected through physiological measurements.**

This novel paradigm, which we have branded Passive Interactive Storytelling, addresses both issues of interaction sampling and accuracy of input processing. In addition, it is based on filmic theories of emotion that posit the existence of narrative cues, which in turn prompt the viewer's emotional response. The viewer is watching an animation film, whose plot is based on the popular medical drama genre, and involves tense medical situations as well as personal relationships between the characters. The action is generated in real-time using Artificial Intelligence techniques that maintain the causality of narrative actions. The system monitors in real-time emotional parameters acquired through skin conductance and facial electromyography.

The different sampling rates of these two signals are mapped to the choice of the next narrative actions as well as the pace of the overall story, making the whole story responsive to the user's emotions, whilst preserving the boundaries of the underlying plot. We have carried out user experiments with 23 subjects, which have validated this proof-of-concept prototype by showing a strong correlation between dramatic tension and emotional response. In addition, these experiments have established that the emotional response does not impair the logical understanding of the narrative actions, meaning that emotional input does not just constitute a shallow reaction to on-screen actions.

**Figure 2** An interactive narrative responding to the viewer's affective state. The course of the narrative is modified by the subject's response, which is captured through physiological signals (left).



**Dr Fred Charles**

T: 01642 342659  
E: f.charles@tees.ac.uk



**Dr Julie Porteous**

T: 01642 342492  
E: j.porteous@tees.ac.uk

# Health and Social Care Institute

Health and social care involves massive expenditure in an era of economic challenge. Costs rise with increasing demand from a growing and ageing population, and as new treatments become available. It is absolutely critical that high quality evidence underpins the choice of treatments and care programmes.

The Institute's focus is to undertake cutting-edge research relevant to today's problems. Our research – from Cochrane reviews and randomised controlled trials through to qualitative ethnographic work and realist evaluation – aims to be translatable into policy and practice through close working with clinical and practice partners and the end users of research at all stages from inception to dissemination.

The relevance and dynamism of our research have made us leading partners in many multi-centre collaborations, with advice sought by national and international bodies like the World Health Organisation.

Professor Janet Shucksmith  
Director

T: 01642 342909  
E: [j.shucksmith@tees.ac.uk](mailto:j.shucksmith@tees.ac.uk)



## Key institute themes



### Knowledge exchange in public health

Translating public health research evidence into practice and policy is stimulated by our collaboration in Fuse, The Centre for Translational Research in Public Health, which is one of five centres of excellence funded by the UK Clinical Research Collaboration. This major consortium comprises researchers from the five North East universities and is a key player in the National School for Public Health Research. The Health and Social Care Institute's strength in knowledge exchange is demonstrated by the siting of the Fuse Knowledge Exchange hub here and the appointment of Rosemary Rushmer as Professor of Knowledge Exchange in Public Health.

### Physical activity (intervention development and measurement)

Professor Alan Batterham leads a group of researchers looking at aspects of measurement around exercise interventions. This work group has a foot in both public health and rehabilitation science camps, with Research Councils

UK and National Institute for Health Research (NIHR) funded projects looking at exercise interventions to improve levels of activity and reduce obesity. In terms of clinically focused work, NIHR grants undertaken in collaboration with clinical colleagues fund research exploring exercise as a form of preparation and rehabilitation for surgical intervention.

### Management of pain and painful conditions

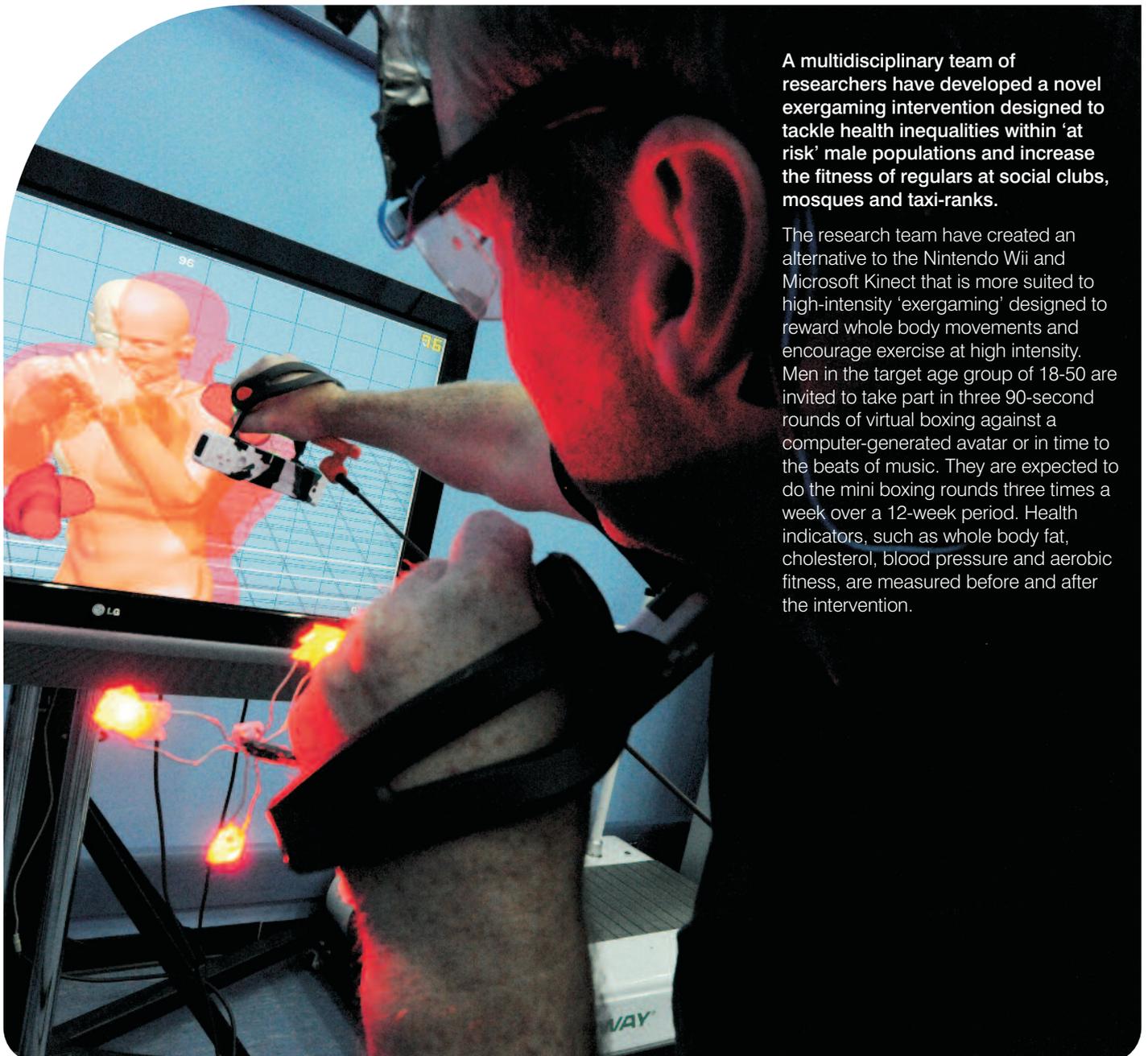
Research in rehabilitation sciences is focused on exploring disabling and painful conditions and examining the management of pain using the development and application of technology. Professor Denis Martin leads a growing group of researchers undertaking work in a range of styles, from the production of Cochrane reviews and practice guidelines to clinical trials and qualitative work looking at ways of expressing and coping with pain. With a clinical research facility housed in the James Cook University Hospital in Middlesbrough, equipped with state-of-the-art equipment, this group is also the North East England Hub for the National Physiotherapy Research Network.

### Chronobiology

Chronobiology is an area straddling our rehabilitation science and public health strands of work, and led by Professor Greg Atkinson. In public health terms chronobiology has the power to contribute to research work on blood pressure control, sleep apnoea, and the connections between shift work and health. In the clinical sphere the links between circadian rhythms and hypertension have implications for work on stroke and sudden death. Professor Atkinson's international links make this an exciting area in which to develop research which has already attracted great interest from bodies like the Civil Aviation Authority, manufacturing industry and major football teams.

## Case studies

# Boxing clever in the North-East



A multidisciplinary team of researchers have developed a novel exergaming intervention designed to tackle health inequalities within 'at risk' male populations and increase the fitness of regulars at social clubs, mosques and taxi-ranks.

The research team have created an alternative to the Nintendo Wii and Microsoft Kinect that is more suited to high-intensity 'exergaming' designed to reward whole body movements and encourage exercise at high intensity. Men in the target age group of 18-50 are invited to take part in three 90-second rounds of virtual boxing against a computer-generated avatar or in time to the beats of music. They are expected to do the mini boxing rounds three times a week over a 12-week period. Health indicators, such as whole body fat, cholesterol, blood pressure and aerobic fitness, are measured before and after the intervention.

# Producing critical evidence to ensure best treatment for painful fractures

Dr Helen Handoll is grant holder and trial methodologist in a Department of Health's Health Technology Assessment project. ProPHER ([www.propher.org](http://www.propher.org)) is a randomised controlled trial now nearing completion and is a joint collaboration between Teesside University, the University of York and Teesside Visiting Professor Amar Rangan, consultant orthopaedic surgeon at James Cook University Hospital in Middlesbrough, as principal investigator and clinical lead.

It aims to obtain reliable evidence of the effectiveness and cost effectiveness of different treatments for displaced fractures of the proximal humerus (upper arm bone) in adults. These types of fractures are more common in older women and are linked with osteoporosis. Surprisingly perhaps, there is considerable variation across the country in the ways that such fractures are treated, and they often have an unsatisfactory outcome.

Dr Handoll, who is co-ordinating editor of the Cochrane Bone, Joint and Muscle Trauma Group, has been tracking the success of different forms of treatment through Cochrane Reviews. These have shown a lack of reliable evidence to inform key management decisions, in particular, the question of whether displaced proximal humeral fractures should be treated surgically.



**Professor Greg Atkinson**  
T: 01642 342758  
E: [greg.atkinson@tees.ac.uk](mailto:greg.atkinson@tees.ac.uk)



**Professor Alan Batterham**  
T: 01642 342771  
E: [a.batterham@tees.ac.uk](mailto:a.batterham@tees.ac.uk)



**Dr Helen Handoll**  
T: 01642 342750  
E: [h.handoll@tees.ac.uk](mailto:h.handoll@tees.ac.uk)



**Professor Denis Martin**  
T: 01642 342754  
E: [d.martin@tees.ac.uk](mailto:d.martin@tees.ac.uk)



**Professor Rosemary Rushmer**  
T: 01642 342756  
E: [r.rushmer@tees.ac.uk](mailto:r.rushmer@tees.ac.uk)



# Institute of Design, Culture and the Arts



The Institute of Design, Culture and the Arts is dedicated to analysing both historical and contemporary practices of design, culture and the arts. The Institute proudly creates and enhances spaces for research and scholarship, promoting dialogue and collaboration between researchers.

**Members of the Institute are engaged in both cross-disciplinary thematic projects and discipline-based research.**

Designers, animators, art and design theorists, performing artists, fine art practitioners, new media researchers, critical and cultural theorists, and historians facilitate public-facing debate, discourse and research collaboration around three key themes.

Professor Nigel Copsey  
Director

T: 01642 384093

E: [n.copsey@tees.ac.uk](mailto:n.copsey@tees.ac.uk)



## Key institute themes



### Digital media and the moving image

The digital media and the moving image research cluster focuses on the impact and use of animation and film across a broad range of cultural practices. Many of the research staff work in interdisciplinary contexts and have growing international profiles that locate the Institute as an important centre for innovation in the study of the moving image and new media. Researchers aim to engage internationally with contemporary issues that connect communities and question identity. Simon McKeown has an international profile as an animation and filmmaker confronting issues of perceptions of disability and ability. Samm Hailay is also known internationally as a short and feature film producer whose work is situated in the threshold between art making and commercial film production. His films explore themes of personal identity, aspects of contemporary society, alienation and isolation.

### Emerging creative narratives

Emerging creative narratives is a growing research theme in the Institute and aims to inspire and draw together interdisciplinary research that examines the relationship between author and film, between current events and memory, between authenticity and dramatisation. Dr Rachel Carroll's research examines how literary texts are re-interpreted for creative presentation in other media, extending adaptation studies beyond its traditional focus on 'page to screen' transpositions. She has also published work on postmodern representations of the past, testimony and traumatic memory.

Dr Simon Morris, the author of numerous experimental books, is a conceptual writer who engages extensively with models of collaboration, digital technologies, performance writing, psychoanalysis and art history. He works to create a space of transference where linking and connecting can take place – a shared space of encounter wherein non-meaning allows the reader to construct their own meaning.

### Multicultural Britain and its enemies

Multicultural Britain is a key theme that draws together research in history with research in English studies. Professor Nigel Copsey and Dr Matthew Feldman examine the modern-day challenges to multicultural Britain that originate from the extreme right and lead the first research unit in Britain dedicated to the study of the far right and its sometimes equally violent opposition.

Dr Rehana Ahmed, a specialist in postcolonial studies, has particular interests in twentieth and twenty-first century British Asian literature and culture, and the history of the South Asian diaspora in Britain. She is the recipient of a prestigious Arts and Humanities Research Council Early Career Fellowship for a project entitled *Muslims writing Britain and beyond: faith, class and multicultural politics* (2011-12).

## Case studies

# The last taboos of disability

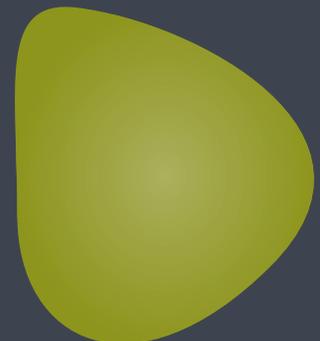


*Simon McKeown pictured with  
Baroness Grey-Thompson DBE*

Motion Disabled concerns the cultural presentation of disability and the field of disability art expressed by the visual artist, Simon McKeown, Reader in 3D Animation and Post Production. Motion Disabled is a digital exploration of the bodies of people who are physically different, his work addresses the cultural taboo around disability. The work makes use of motion capture, a technique more commonly associated with feature films and computer games, along with 3D animation to create a kinetic connection with the human form. It was created by recording the physical movements of 14 physically impaired people.

Motion Disabled, went global in a single day when it was projected on to buildings in 17 countries all over the world. The most prestigious exhibition venue was the Smithsonian International Gallery in Washington DC. The events were viewed by thousands of people and covered by news media, including the BBC.

Simon's work was commissioned by the Unlimited Programme, part of the London 2012 Festival and Cultural Olympiad.



# Right-wing extremism in contemporary Britain

**The ground-breaking Centre for Fascist, Anti-fascist and Post-Fascist Studies examines the historical development of far right politics and culture as well as its political trajectory in the 21st century. Professor Nigel Copsey and Dr Matthew Feldman lead the Centre, which builds upon their reputations as two of the leading UK experts on aspects of fascist and anti-fascist extremism.**

Professor Nigel Copsey has spent over two decades researching the far right in Britain, both in its historical and contemporary manifestations. This period has seen the electoral rise and decline of the British National Party as well as the recent and rapid emergence of the street-activist English Defence League. His research in this field has been recognised nationally and internationally. Recent notable contributions include evidence to the House of Commons Home Affairs Committee inquiry into the roots of violent radicalisation (2011); contributions to a Scandinavian TV documentary on the Defence Leagues (2012); and an invited paper on multiculturalism and the extreme right challenge in contemporary Britain at an international conference at Korea University (2012).

Dr Matthew Feldman is an expert on fascist ideology and the contemporary far-right in Europe and the USA. He has acted as an expert witness in a number of

Crown Prosecution Service trials against far-right terrorists in Britain; in addition to giving evidence to various governmental bodies including the Home Affairs Select Committee; the All-Party Working Group on Anti-Semitism, and briefings for British enforcement, intelligence and probation agencies. He has also discussed issues relating to the far-right, anti-Muslim politics and 'lone-wolf' terrorism on interviews for Channel 4 News, BBC 24 and many other television outlets, alongside several dozen appearances on radio and online and broadsheet news interviews. In addition to this public-facing research, Dr Feldman has written widely on these subjects for

academic journals as well as popular media such as *The Independent*; *Truthout*; *Fair Observer* and many others online. Larger projects on the interaction between politics and faith in the modern world extend to the five volume *Fascism: Critical Concepts* series (2004; with Roger Griffi); the edited books from 2008, *A Fascist Century and Clerical Fascism in Interwar Europe* (with Marius Turda and Tudor Georgescu); *Doublespeak: The Rhetoric and Framing of the Far Right* (2013; with Paul Jackson) and the recent interdisciplinary monograph, *Ezra Pound's Fascist Propaganda 1935-1945* (Palgrave, 2013).



**Dr Rehana Ahmed**

T: 01642 384059

E: r.ahmed@tees.ac.uk



**Dr Rachel Carroll**

T: 01642 384029

E: r.carroll@tees.ac.uk



**Dr Matthew Feldman**

T: 01642 384073

E: m.feldman@tees.ac.uk



**Samm Hailay**

T: 01642 342365

E: s.hailay@tees.ac.uk



**Simon McKeown**

T: 01642 738125

E: s.mckeown@tees.ac.uk



**Dr Simon Morris**

T: 01642 738219

E: simon.morris@tees.ac.uk

# Social Futures Institute



The Social Futures Institute aims to conduct internationally excellent research on contemporary social issues. The Institute intends to further knowledge in its selected areas of specialism and, wherever possible, ensure impact in the real world. Our research interests are wide-ranging and include the disciplines of social policy, criminology and criminal justice, sociology, youth studies and education, sport and exercise science and psychology.

**The Institute also includes the Centre for Strategy and Leadership, which is the focus for research in business.**

The Institute has a strong track record in gaining external awards from prestigious national and international funding bodies. We have recently received grants from the British Academy, Arts Council England, the European Commission, the Economic and Social Research Council, the Engineering and Physical Sciences Research Council, and Joseph Rowntree Foundation among others. We play an important role regionally in conducting research and evaluation studies with a range of partners in the public, private and third sectors, as well as offering consultancy and support on policy development.

Dr Paul Crawshaw

Director

T: 01642 384053

E: [p.crawshaw@tees.ac.uk](mailto:p.crawshaw@tees.ac.uk)



## Key institute themes



### Realist criminology

**Research in criminology is driven forward by the newly-formed Teesside Centre for Realist Criminology. The realist focus of the Centre demonstrates a commitment to depict the criminological landscape intellectually in ways that represent its actuality. Together, members of the Centre aim to construct an account of crime, violence and social harm – as well as criminal justice and the general social reaction to these phenomena – that is entirely shorn of the sentimentalism and idealism that continue to play a dominant role in criminology.**

Members of the group are committed to gathering empirical data that relates directly to the present shape and character of crime, harm and criminal justice. As well as making strong contributions to the analysis and theorisation of familiar forms of crime and harm, the work of the Centre addresses new criminological phenomena as they occur.

The vision for the Centre is to continue to develop a vibrant and ambitious research

culture that excels in incubating ideas, publishing to the highest possible standards of quality and innovation, generating research income and attracting talented postgraduate students. The growth of the Centre over time is an important goal for its members. A mentoring system has been developed to provide encouragement and guidance to early career researchers so that they can quickly become sufficiently confident to develop their own publications and write and submit their own grant applications.

Income generation is also a key issue for members of the Teesside Centre for Realist Criminology. It is crucial both for conducting high quality empirical research and funding activities that enhance the research environment of the Centre, such as the employment of research assistants and the invitation of key visiting scholars and guest speakers. Recent successes include funding from the Northern Rock Foundation, and major awards secured by criminologist Professor Georgios Antonopoulos funded through EU FP7.

The Teesside Centre for Realist Criminology is directed by Professors Simon Winlow and Steve Hall. Professor Winlow's specialist areas include violence and masculinity; crime and the leisure economy; criminological theory; social exclusion; ideology and subjectivity. They work closely together and their work on the relationship between crime and consumer culture has received international critical acclaim.

Professor Georgios Antonopoulos and Dr Georgios Papanicolaou are also leading figures in realist criminological research at Teesside. Their research interests include cross-border crime, the political economy of policing and the social organisation and regulation of illicit markets, particularly in a transnational context. Dr Papanicolaou's published work is concerned with the historical development and present state of policing in Greece, as well as the configuration and policing of dirty economies in that country, particularly in light of their connection with human smuggling and trafficking.

## Key institute themes

**Youth research**

The Youth Research Unit, directed by Professor Tracy Shildrick, has an international reputation for cutting-edge social scientific research with young people and on youth issues. Building on intensive, influential long-term studies of youth transitions in the UK, members of the Youth Research Unit have extended their critical analysis of social exclusion, poverty and worklessness through further qualitative research with older workers and families. Funded by the Joseph Rowntree Foundation, the most recent study is the fifth in a series that critically examines whether social policy and academic orthodoxies connect with the lives of people in deprived neighbourhoods. This work looks at the popular idea of intergenerational cultures of worklessness, specifically families where in three generations no-one has ever worked, and is discussed as a case study in this report.

As well as disseminating research findings through leading international journals and research monographs, Professors Tracy Shildrick and Rob MacDonald have led initiatives to influence policy and practice regionally, nationally and internationally. Recent examples include a highly successful, 18-month knowledge transfer project with Middlesbrough Council and the Institute for Local Governance, invitations to present research analyses to the Academy of Social Sciences about the causes of the English riots in 2011 and to the Council of Europe about improving policies to tackle child poverty.

**Sport and exercise**

Research in this area takes a holistic approach to enhancing the exercise experience for a range of populations from elite athletes to hard-to-reach groups. This approach to exercise interventions involves two main strands: to maximise the benefits of training with specific emphasis on performance and injury avoidance; and secondly, to maximise the time-efficiency and enjoyment of exercise programmes with specific emphasis on reducing health inequalities. Current research deals with new approaches to statistical methodologies and the development of new technologies in the area of sport and exercise.

**Applied psychology**

Research activities in psychology vary from theoretical cognitive and behaviourism approaches to the applied area of forensics and health. Particular strengths include ongoing work in health psychology, with particular emphasis upon complementary and alternative medicines, as well as human and computer interaction.



## Case studies

# Intergenerational cultures of worklessness

**A Joseph Rowntree Foundation-funded project has investigated the concept of intergenerational cultures of worklessness. Professor Tracy Shildrick is leading a team of researchers from Teesside and Glasgow universities.**

The study aims to critically interrogate the idea that worklessness becomes concentrated in families over time because of cultural outlooks, attitudes and behaviours that are passed down the generations. In-depth qualitative interviews were held across different generations in 20 families who have experienced long-term worklessness in deprived areas of Glasgow and Teesside. The idea that three generations of families have never worked

is a very popular one with politicians, policy makers and the general public but there is very little hard evidence to suggest that this is a real or extensive phenomenon. The research, published by the Joseph Rowntree Foundation in September 2012, provided a rigorous test of these ideas and concluded that – contrary to much current rhetoric – a strong commitment to employment remained even in heavily disadvantaged and long-term workless households. The researchers will use the study to challenge contemporary myths about worklessness and to inform better policy and practice, nationally and locally, towards the problems of long-term poverty and worklessness.

## Theoretical criminology

**The Social Futures Institute has a global reputation in the field of theoretical criminology. Professor Steve Hall's seminal work on the complex connections between crime and consumer culture has achieved critical acclaim, and his theory of the pseudo-pacification process has the potential to significantly influence the trajectory of contemporary criminological theory.**

Professor Hall is particularly interested in the historical evolution of violence and those social structures and processes that attenuate the drives towards subjective violence. His work represents a significant departure from established thinking in

contemporary criminological theory, and challenges the liberal presuppositions that structure much academic criminology in the West.

Professor Simon Winlow has an established track record in the field of critical, theoretical and cultural criminology and is perhaps best known for his seminal ethnographic work with violent offenders. Professor Winlow's work is notable as he displays a willingness to draw theoretically from fields that are usually ignored in mainstream criminology. In particular, he has drawn upon theoretical psychoanalysis and continental philosophy in order to address subjectivity

and culture in his analysis of violence and social harm. He is also the co-organiser of the second wave of deviancy conferences, which, beginning at the University of York in 2011, represent an important global forum for the development of critical and theoretical criminology. Both Professors Hall and Winlow have published widely in the field of theoretical criminology and sit on the editorial boards of major academic journals in the field. Their work is cited extensively in criminological textbooks, monographs and journal articles throughout the English-speaking world. Their article *Shopocalypse Now* is currently at the top of the most-read list in the flagship *British Journal of Criminology*.



**Professor Georgios Antonopoulos**

T: 01642 342350  
E: g.antonopoulos@tees.ac.uk



**Professor Steve Hall**

T: 01642 384437  
E: steve.hall@tees.ac.uk



**Professor Robert MacDonald**

T: 01642 342351  
E: r.macdonald@tees.ac.uk



**Dr Georgios Papanicolaou**

T: 01642 738162  
E: g.papanicolaou@tees.ac.uk



**Professor Tracy Shildrick**

T: 01642 384047  
E: t.a.shildrick@tees.ac.uk

# Centre for Strategy and Leadership

In a period of significant global and local economic challenges and in this new era of socio-economic restructuring and realignment, during which both private (wealth-creating) and public (wealth-spending) organisations are having to change radically and to innovate, there is an urgent need for research which can inform policy and practice, and support leaders who are trying to respond to these challenges – as well as to empower and inform individuals who take on the risk and personal responsibility of being entrepreneurial and innovative in various contexts. The Centre responds to this need by undertaking cutting-edge research, often in collaboration with practitioners and policymakers. It aims to pursue academic excellence and promote effective practice in three broad themes – leadership and organisational change; marketing and strategy; and risk, integrity and governance.

## Key institute themes

### Leadership and organisational change

Led by Professor David Preece, leadership research is often seen as synonymous with the activities of senior figures in business, politics or sport, while organisational change is associated with restructuring, mergers or introducing new technologies. Yet both concepts are much broader and more complex than this, and our research reflects this. Our work has examined broad changes affecting whole sectors, such as Professor Preece's work on change and restructuring in UK public house retailing, and with colleagues on changing forms and modes of leadership and management in UK social housing and leadership development and talent management practices in the UK, South East Asia and China.

A similarly broad perspective can be observed in Professor Joyce Little's examinations of leadership, governance and partnership challenges in the public and third sectors, and public/private hybrid organisations. Professor Little leads an international leadership research network on sustainable regional and urban leadership, and has undertaken partnership and leadership research for the

Home Office, Office of the Deputy Prime Minister and other national, regional and local government agencies, in the UK and overseas.

### Risk, integrity and governance

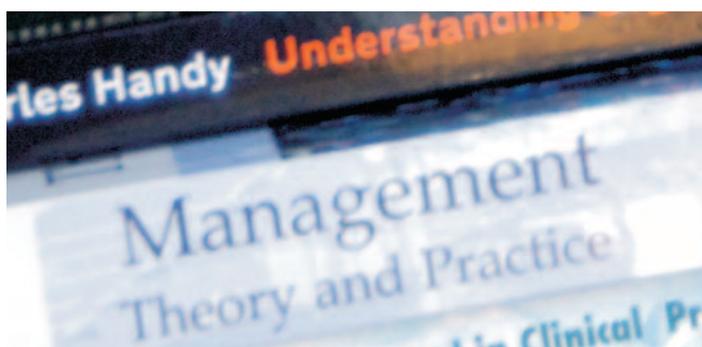
This theme, led by Rob McCusker, builds on our longstanding expertise in the fields of organisational ethics, fraud and financial crime, transnational crime and anti-corruption. Other Centre members have undertaken research into whistle blowing and audit practice. Findings are published in international journals, and members have written key policy papers for government bodies in the UK and overseas. Members have also worked with agencies such as the FBI, APEC, the United Nations, the Council of Europe, and the US State Department.

### Marketing and strategy

The marketing and strategy theme is led by Professor Mark Davies, whose own research focuses on the role of marketing information and decision support systems for improved decision-making, market modelling and positioning, as well as managerial perspectives on marketing communications, including relationship management, tolerance, and trust. Dr Jonathan M. Scott's collaborative research focuses on access to finance for small and medium-sized enterprise and social enterprise owner-managers and entrepreneurs. This research has had an emphasis upon diversity, ie gender and ethnic differences in access to finance. Other researchers within this theme are currently examining a range of issues with significant implications for policy and practice, including on the impact of personal relationships on entrepreneurship, brand awareness in fashion retailing, ethical consumer behaviour, strategy in the travel industry, and economic clusters.

## Case studies

# Regional and urban leadership



**Building on a body of earlier research on governance, partnership and leadership, Professor Liddle leads a multi-national leadership network of global scholars examining sustainable regional and urban development. The research brings together understandings of leadership in numerous global settings to develop common theoretical, conceptual and methodological frameworks. In a field largely dominated by Anglo-American business and management approaches, the researchers are developing enhanced theories, concepts and methodological developments to shape new approaches to leadership in urban and regional places.**

The work is ground breaking in challenging an existing knowledge base located within differences between structure and agency, and a specific focus on individual agency. Understanding leadership as a socially embedded and multi-scalar activity, or a relay in time, shows how leaders create

capacity to act, and respond to external global shocks. The research also reveals how regional and urban leaders use, and transfer knowledge, vertically and horizontally within places, to align traditional and new strategies for transformation and competitive advantage. Initially funded by the International Regional Studies Association (IRSA), further research is being supported by IRSA, Wageningen University, The Netherlands, and the Economics University, Prague.

## Integrity systems

The Centre leads the way in research into local and national integrity systems. The national integrity system (NIS) model was devised in the late 1990s by Transparency International as a means of evaluating the robustness of anti-corruption mechanisms in different nations. The UK NIS has been assessed twice, in 2003 and 2011, and on each occasion the research was conducted by the Centre. The popularity of

the NIS model has led scholars in Europe and Australasia to develop concepts of local integrity systems (LIS) and the Centre has performed the only comparative evaluation of the LIS frameworks in England, Scotland and Wales. This work has built upon a considerable body of work at Teesside in the field of local governance and integrity including national surveys of monitoring officers, and qualitative evaluations of local standards committees.

The Centre is currently conducting a national survey into the change-readiness of local authorities for the new integrity framework to be implemented following the enforcement of the Localism Act 2011. As well as being cited in numerous academic texts, the work on integrity systems has been cited in government strategy documents, and quoted in national and international media. The projects have been funded from various sources including the Joseph Rowntree Trust, Standards for England, and the European Union.



**Professor Mark Davies**

T: 01642 342882  
E: mark.davies@tees.ac.uk



**Professor Joyce Liddle**

T: 01642 342808  
E: joyce.liddle@tees.ac.uk



**Rob McCusker**

T: 01642 342880  
E: r.mccusker@tees.ac.uk



**Professor David Preece**

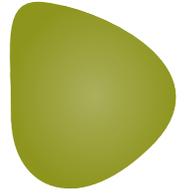
T: 01642 342919  
E: d.preece@tees.ac.uk



**Dr Jonathan M Scott**

T: 01642 342864  
E: j.scott@tees.ac.uk

# Technology Futures Institute



The Technology Futures Institute is an international leader in key areas of research and innovation related to sustainable engineering, advanced processing, and measurement and control. As well as developing applications-focussed new knowledge and technologies, the Institute provides a wide range of services through its strong, long-standing relationships with public and private sector organisations.

**The North East of England is leading the way in the transition to the low carbon economy and the Institute is at the heart of this exciting, interdisciplinary activity.**

As a major centre for the chemical and process industries, the Tees Valley is home to major international companies that are actively involved in developing new clean technologies, including bioprocesses and biotechnologies, biofuels and hydrogen technologies. Our research and innovation activities complement these areas through active collaboration and dynamic knowledge exchange. The Technology Futures Institute has a key role to play in securing the region's future as a world-leading low carbon industrial centre.

Professor Nashwan Dawood  
Director

T: 01642 342405  
E: [n.n.dawood@tees.ac.uk](mailto:n.n.dawood@tees.ac.uk)



## Key institute themes



### Engineering sustainability

The engineering sustainability theme focuses on the sustainability of the built environment. There is a particular focus on the use of information and communication technology for building information management and modelling and for visualising construction processes. This work helps to improve the energy efficiency of buildings, both during their operation and throughout their entire life-cycle. Our work within the IntUBE (Intelligent Use of Buildings Energy information) European research project sought to increase the life-cycle energy efficiency of buildings without compromising user comfort, through integration of the latest information technology.

Renewable energy generation capacity coupled to highly efficient built environments makes energy positive neighbourhoods possible – places which produce more power than they need. The IDEAS project, aims to illustrate how communities, public authorities and utility companies across the EU can be engaged in the development and operation of energy positive neighbourhoods. The project will demonstrate how energy positive neighbourhoods can be implemented – cost effectively and incrementally. This project will include the development of neighbourhood energy management and decision support tools for urban planning, together with creative business models to allow end users, public authorities and utility companies to make energy positive neighbourhoods a reality.

### Manufacturing and process engineering

With the development of bespoke, advanced and functional materials for specific industrial applications a particular focus is on nanomaterials and materials for eco-design and the use of micro- and nanomaterials that have high density and enhanced functionality.

Professor Simon Hodgson has worked extensively in developing surface coatings for stainless steel to impart high temperature corrosion resistance to steel components. Ceramic coatings via sol-gel methods have been demonstrated to have superior corrosion resistance compared to other traditional manufacturing techniques. Other related research includes improved production methods of tungsten oxide thin films used in energy saving smart-windows.

Professor Maria Olea focuses on preparing heterogeneous catalysts and optimising their performance by modelling the surface processes that occur during catalytic reactions. There is a particular focus on the development of catalysts for use in environmental applications such as the production of chemicals and fuels from biomass feedstocks, treating waste water and reducing emissions of volatile organic compounds.

The particular focus on miniaturised, high density and functional devices is on microfluidics for chemical and biological processing. Professor Zulfiqur Ali has been working on a point-of-care device to aid diagnosis of deep vein thrombosis. Other related work includes a microfluidic bioreactor array for cytotoxic drug testing of breast cancer cell line.

### Measurement and control systems

This theme applies intelligent algorithms in systems control, advanced chemical analysis technologies, and process flow measurement in challenging environments. There is long-standing expertise in measuring the flow of fuel in power stations to enhance the efficiency and reduce the environmental burden of power generation (see case study). There is a further area of research into dependable, real-time embedded control systems, such as those found in aircraft and automotive control systems, medical devices and robots. Specifically, the behaviour of these embedded systems is being investigated.

This work includes a novel hardware-in-the-loop real-time simulation of a passenger vehicle travelling down a busy three-lane motorway analysing embedded automotive control systems (such as adaptive-cruise-control) under various normal and abnormal operating conditions. Another significant research area within this theme is the application of fuzzy logic and neural-fuzzy models to medical physics – for example, applying neural networks and neural-fuzzy modelling in continuous, non-invasive blood gas predictions in intensive care patients with breathing difficulties.

Dr Tim Thompson, together with Dr Meez Islam, is investigating novel analytical methods to determine the context of burning from skeletal remains, a challenging requirement in forensic and archaeological analysis. This work has investigated burned bones from a range of contexts, including past funerary customs.

## Case studies

# Greening electricity generation from coal

Measurement and control systems are at the heart of effective energy generation and the transition to a low carbon economy. Coal fired power stations are among the most carbon intensive forms of electricity generation, yet are also a large part of the energy mix. In the UK 28% of our electricity is generated from burning coal and globally the figure is over 40%. One of the challenges faced by coal fired power stations in increasing their efficiency is the measurement and control of pulverised coal flow in the pipes that deliver the fuel to the combustion chambers. Measured fuel flow helps operators to optimise the fuel/air mix and achieve efficient combustion.

We have worked with ABB Ltd to develop online measurement of coal flow using novel electrostatic sensor technology. Since the first successful trial of the sensor at Methil power station in Scotland in 1996, we have improved its capabilities by developing a detailed understanding of the impact of the distributions of particle size, velocity and density within the fuel conveyor pipework on the system's sensitivity.

The sensor has now been installed world-wide and is reducing emissions and improving the efficiency of power stations in the UK (half of the UK's 15 coal fired power stations currently use the technology), America, Canada, Portugal, Japan, South Korea and China.



# Reducing the climate impact of the built environment

Many European cities have issued climate change policies and set targets for CO2 emissions reduction, but the implementation of these policies in urban planning remains a challenge. Recent advances in information and communication technologies (ICTs) present opportunities to improve the way energy profiling tools and techniques are used to measure and inform the energy performance of buildings throughout their life cycle.

The new European-funded, SEMANCO project will develop an ontology-based energy information system, and associated tools, to help stakeholders involved in

urban planning to make informed decisions about how to reduce CO2 emissions in cities. The software and data modelling methods will allow planners to assess all the variables that contribute to a carbon footprint and to evaluate the most efficient solution in terms of cost, carbon emissions reduction and fuel poverty relief.

The project will run three case studies at Riverside Dean in Newcastle, in Spain in the Manresa area of Barcelona and the other in the North Harbour, Copenhagen. This work has led to thinking about how the intelligent use of building information can be used to inform the design of local energy infrastructures.

SEMANCO



**Professor Zulfiqur Ali**

T: 01642 342532  
E: z.ali@tees.ac.uk



**Professor  
Simon Hodgson**

T: 01642 342403  
E: s.n.hodgson@tees.ac.uk



**Dr Meez Islam**

T: 01642 342410  
E: m.islam@tees.ac.uk



**Professor Maria Olea**

T: 01642 342447  
E: m.olea@tees.ac.uk



**Dr Tim Thompson**

T: 01642 342535  
E: t.thompson@tees.ac.uk



# Graduate Research School



The Graduate Research School (GRS) provides an expert focal point for the support of all aspects of research activity. We are responsible for co-ordinating activity around research funding and project development, research degrees, research governance and research policy and strategy. Our goal is to ensure the sustainability of areas of established and emerging research activity and we aim to create a culture and infrastructure within the University which supports and nurtures high-quality research. Notably, the University is recognised by the European Commission for researcher development through our HR Excellence in Research Award which is given to organisations which have a robust and public implementation strategy for improving the career development and management of researchers.

GRS works closely with the five research institutes to promote research across the University and to support the co-ordination

of our Research Excellence Framework preparations. Our activities assist all members of the research community, from professors and established academics to early career researchers and PhD students. We organise regular networking events to exchange knowledge and to support creative conversations across different disciplines. GRS offers training for postgraduate research students on important aspects of research practice at different stages of their research degree. We also provide courses for researcher development which includes PhD supervisor training, research ethics and integrity as well as research leadership.

We support our researchers most significantly by coordinating University-funded Doctoral Scholarships, and project start-up funding through the University Research Fund. Research collaboration with private and public sector partners, nationally and internationally, are supported in a number of ways, including through the International Visiting Academic Scheme. Teesside University also leads the Enterprise Europe Network for the

North East of England. This is part of a Europe-wide network of organisations that helps small businesses to make the most of the European marketplace and provides us with an opportunity to support the development of European research collaborations.

For all enquiries regarding research at Teesside University, please do get in touch and see how we can help you.

Professor Zulfiquar Ali  
Dean

T: 01642 384438

E: [researchfunding@tees.ac.uk](mailto:researchfunding@tees.ac.uk)

🖱️ [tees.ac.uk/research/grs](https://tees.ac.uk/research/grs)

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# TeesRep and Library & Information Services

**TeesRep is the institutional research repository for Teesside University, and is administered by the Library & Information Services.**

It is an open access digital archive of research outputs, set up to collect, preserve and disseminate the University's research. TeesRep gives you access to a growing collection of peer-reviewed research and e-theses produced by Teesside University researchers. It makes research accessible without the constraints of subscriptions or registrations and is part of a network of over 200 repositories in the United Kingdom and 2000 repositories worldwide.

TeesRep includes a mixture of full-text items and metadata only records including journal articles, books, book chapters, conference papers and PhD theses. It will support the Research Excellence Framework by providing an accurate record of publications.

Academic librarians from the Learning & Research Support team provide advice on study skills, information and research needs. They meet with new researchers to help familiarise them with the resources available in their subject area. Researchers have access to over 100 online databases, over 90,000 journal and conference proceedings titles, in print and electronic

format, over 50,000 electronic books and over 285,000 books in the print collection. In addition researchers can obtain books and articles from the British Library's Inter Library Loans Service or join the national SCONUL Access service to access print resources in other UK university libraries.

## Find out more

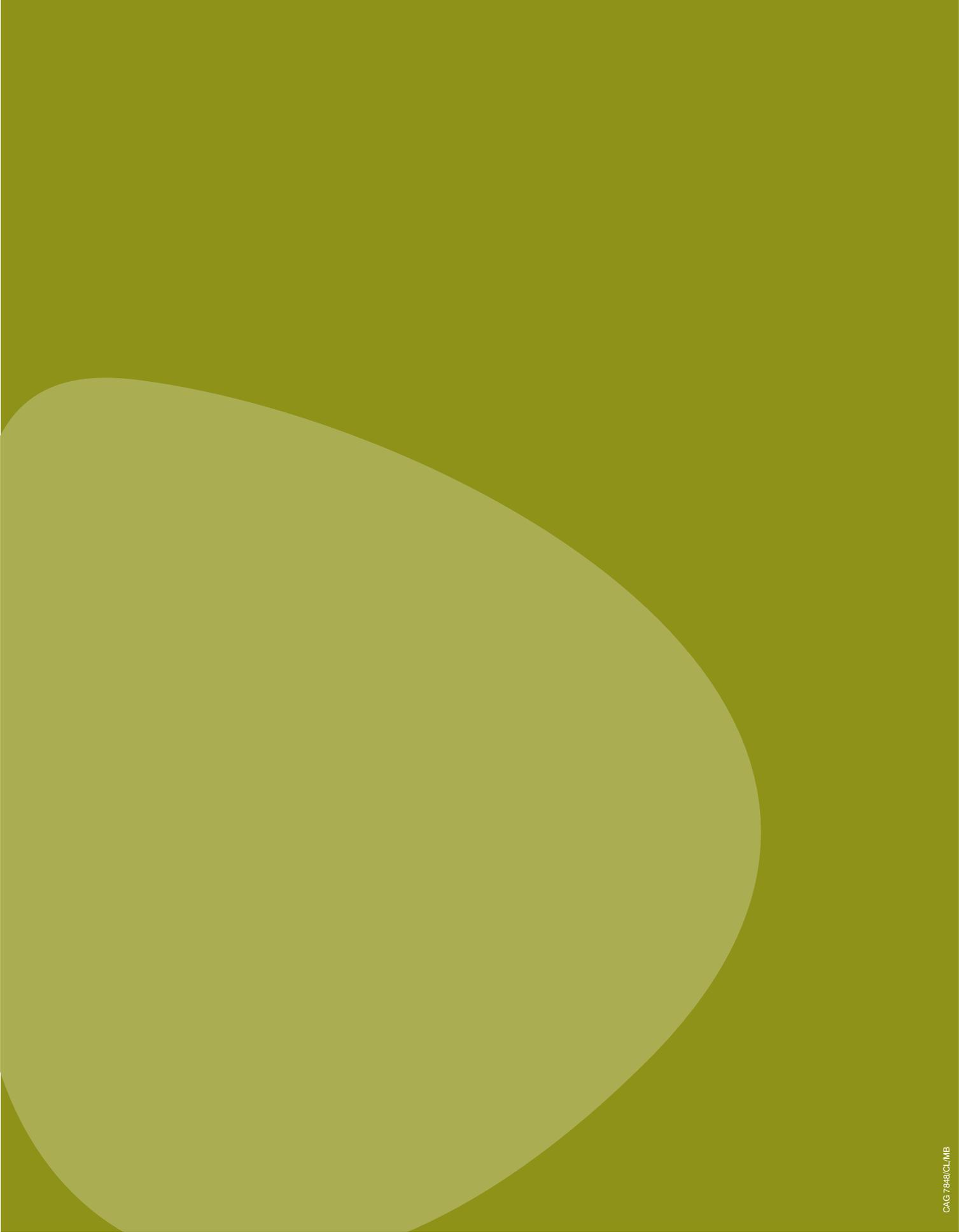
T: 01642 342100

E: [teesrep.team@tees.ac.uk](mailto:teesrep.team@tees.ac.uk)

🖱 [tees.ac.uk/teesrep](http://tees.ac.uk/teesrep)







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**Teesside University**  
Middlesbrough  
Tees Valley  
TS1 3BA UK  
T: +44 (0) 1642 218121  
[tees.ac.uk](http://tees.ac.uk)

