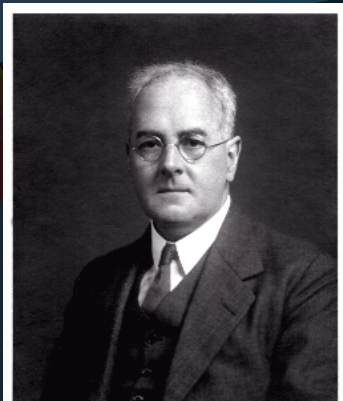




A UNIQUE APPROACH

UWS Research and Enterprise Guide

UNIVERSITY OF THE
WEST of SCOTLAND
UWS



L. F. Richardson, 1931

OUR HERITAGE

Known for much of the 20th century as Paisley College of Technology, the institution that was to become UWS attracted great minds from its earliest years. From 1922 to 1940 the Principal was Lewis Fry Richardson FRS, a noted mathematician, physicist, meteorologist, psychologist and pacifist. His ground-breaking work on fractals inspired the design for this publication.

The cover of each print copy is unique, its pattern determined by the mathematical principles pioneered by Richardson more than 60 years ago.

GENERATIVE ART: LEANDERHERZOG.CH

We are UWS.

We are a modern university, but our roots as an institution go back 120 years.

We have a tradition of practicality and relevance, and we're proud to embrace it. This tradition has shaped a culture and approach that differentiates UWS from other institutions. Our work is typified by cooperation and collaboration across disciplines and our academic schools.

We have a proud record in developing effective partnerships with business, industry and the public and voluntary sectors across Scotland, and in many countries around the world. With our cutting-edge facilities, practical knowledge, and proven expertise, we aim to help our industry partners get ahead.

We focus on what we do well and what we can achieve, identifying opportunities we can exploit and problems we can solve.

The result is that our research work has a tangible, early and positive effect on society. Right here, right now, we are making the world a better place.

UNIVERSITY OF THE
WEST of SCOTLAND
UWS

University of the West of Scotland
UWS.AC.UK/RESEARCH

CONTENTS

04	RESEARCH WITH PURPOSE: Message from the Principal
06	UWS RECOGNITION
08	A TANGIBLE EFFECT ON SOCIETY: Message from the Vice Principal
10	THE VICE PRINCIPAL'S NEW FUND FOR EXCELLENCE
12	HEALTH
22	SOCIETY
30	SUSTAINABILITY
38	ENTERPRISE AND EMPLOYABILITY SERVICES
42	GRADUATE SCHOOL
44	FIVE FROM LIFE: HOW UWS IS WORKING WITH SCOTTISH INDUSTRY
46	CONTACT US



RESEARCH WITH PURPOSE

I'm immensely proud of our research community here at UWS. The innovative technologies we're developing are helping to shape society in Scotland and throughout the world.

UWS academics have played a key role in the observation of ripples in the fabric of spacetime, confirming a major prediction of Albert Einstein's 1915 general theory of relativity. And thanks to our work with partners from seven different countries on the development of the new 5G mobile network, remote surgery and driverless cars may soon become everyday realities.

These are just two examples from across decades of innovative and inspiring research. Today we're committed to building a research culture and research environment of the highest quality, to developing collaborative partnerships, and to ensuring that our research has real-world applications for industry and commerce to exploit.

We were delighted with the extremely positive ratings we received in the Research Excellence Framework (REF) in 2014. The number of research-active academics almost doubled (with 25% of them at early stages in their careers), and the quality of our outputs improved, moving UWS into the top 100 research institutions in the UK. We also gained the prestigious HR Excellence in Research Award from the European Commission in 2016 for our work in supporting career development – an achievement which we hope makes plain our commitment to our people.

We will continue to be bold in our research ambitions. Through strengthening our academic excellence and applying our expertise we will significantly increase turnover, broaden income streams and contribute to the international development of knowledge.

It's an exciting time for research at University of the West of Scotland. I hope you'll enjoy reading about our success, and be inspired by our activity.

PROFESSOR CRAIG MAHONEY
PRINCIPAL AND VICE-CHANCELLOR

UWS RECOGNITION

Among our award nominations in 2015-16, UWS was shortlisted in Scotland's Dementia Awards in conjunction with Alzheimer Scotland in the Best Acute Care Initiative for Scotland's National Dementia Champions Training Team.



UWS has achieved BRONZE accreditation for its work in the **ADVANCEMENT OF WOMEN IN SCIENCE, ENGINEERING AND TECHNOLOGY.**

ACTIVE MULTI-DISCIPLINARY AND COLLABORATIVE RESEARCH PROJECTS AT UWS INCLUDE:

£5,493,197
EUROPEAN COMMISSION
HORIZON 2020
– SELFNET –

£2,158,400
EUROPEAN COMMISSION
– RAPIDTOOL PROJECT –

£2,429,300
EUROPEAN COMMISSION
ERASMUS MUNDUS – GLINK –

£2,439,680
EUROPEAN COMMISSION
ERASMUS MUNDUS
– SMARTLINK –

£805,177
– BBSRC – REGULATING
APPETITE BY TARGETING
NUTRIENT DELIVERY
IN THE GUT

£333,091
EUROPEAN COMMISSION
INTERREG IVA – HONEYCOMB –



HR EXCELLENCE IN RESEARCH

HR EXCELLENCE IN RESEARCH AWARD received from the European Commission for work in supporting research staff in their career development.

RESEARCH EXCELLENCE FRAMEWORK HIGHLIGHTS

In the 2014 REF (Research Excellence Framework) each of our submissions ranked as having international or world-leading status in terms of their originality, significance and rigour. More than half of our research outputs ranked at three to four star, with four star signifying 'world-leading' research. Additionally the number of staff returned nearly doubled compared to RAE 2008.

63%

63% OF ALLIED HEALTH
PROFESSIONS, DENTISTRY,
NURSING AND PHARMACY
SUBMISSION **JUDGED WORLD
CLASS / INTERNATIONALLY
EXCELLENT**

100% OF IMPACT CASE STUDIES IN
COMMUNICATION, CULTURAL AND
MEDIA STUDIES, LIBRARY
AND INFORMATION MANAGEMENT
**JUDGED WORLD CLASS /
INTERNATIONALLY EXCELLENT**

100%

60% OF IMPACT CASE STUDIES
IN GENERAL ENGINEERING
AND IN EDUCATION
**JUDGED WORLD CLASS /
INTERNATIONALLY EXCELLENT**

60%

We believe in
partnership with
business - private,
public and global



A TANGIBLE, POSITIVE EFFECT ON SOCIETY

PROFESSOR EHSAN MESBAHI
VICE-PRINCIPAL & PRO VICE-CHANCELLOR
(RESEARCH & ENTERPRISE)

I'm delighted to introduce this overview of our research activity at University of the West of Scotland. It provides a snapshot of our current work and gives an indication of our direction of travel, highlighting the strengths and capabilities which will shape the future of research at UWS. It's intended for all readers, and particularly anyone who may at some point work with us as a business partner, funder, collaborator, student or colleague.

UWS has six academic schools, four campuses across the west of Scotland and one in London, and a network of research institutes. While our work covers an enormous breadth of interests, it is grouped into three key themes - Health, Society and Sustainability. We actively support and encourage an interdisciplinary approach wherever it's appropriate.

Some of the projects in this publication fit neatly into one of those themes, but many others touch on two or all three, reflecting our collaborative, multi-disciplinary culture. For example our work on Alzheimer's disease and dementia impacts on all three themes - and brings together scientists, health professionals, psychologists, computing scientists and environmentalists in the search for practical and effective measures to improve people's lives. A similar cross-discipline approach has been applied to aquaculture, the built environment, education, social science, the creative industries and many other fields.

This strategy allows us to offer a highly relevant proposition to industry, commerce and the public sectors. You can work with us on a major long-term project or request the help of a single placement student for a short period. Thanks to our accessible, approachable way of working, we can tailor the way we engage so that it fits your needs precisely - and you will always find our culture supportive, interrogative and innovative.

The University's Aspire Centre in Paisley is a dedicated central resource designed to allow businesses and other organisations to engage with our academics. Our new Lanarkshire Campus will be co-located with industry to maximise opportunity for collaboration. We expect to contribute over £1.9billion to the regional economy of Lanarkshire alone over the next 25 years, and are seeking collaboration and cooperation with businesses and other organisations at home and around the world.

Despite our status as a modern university, UWS can trace its heritage back to 1897. We have a proud tradition of supporting the economy and contributing to the society of Scotland, and our people have helped to shape the modern world through research, understanding and application in fields as diverse as healthcare therapies and gravitational waves. Looking to the future, we intend to make UWS Scotland's foremost entrepreneurial university. We've integrated our research, enterprise, employability and graduate school functions to offer partners, customers and students an outstanding experience and effective results.

THE VICE PRINCIPAL'S NEW FUND FOR EXCELLENCE

One defining aspect of our research and enterprise work at UWS is a focus on what we're good at, and good for. Wherever possible we will build on our strengths, identifying opportunities and working where there's a gap in knowledge which we can aim to fill with our skills and facilities. We're working where we can make a tangible, practical and immediate difference.

In 2016 Vice Principal for Research and Enterprise, Professor Ehsan Mesbahi, announced a new £1m fund to support Research and Enterprise Excellence at UWS - together with a set of principles which will help us decide where to spend those funds. To qualify, a proposed project must conform to all or most of our 10 PRINCIPLES OF EXCELLENCE (see opposite).

10 PRINCIPLES OF EXCELLENCE

- ▲ 1 The proposed project will generate research outputs of international or world-class significance
- ▲ 2 It will be relevant to our strategic themes of Health, Society and Sustainability
- ▲ 3 It should show inclusivity of early-stage research colleagues, teaching and enterprise sectors
- ▲ 4 A multi-disciplinary approach is preferred, across Schools as well as disciplines
- ▲ 5 The project should align with funding body and stakeholder agendas
- ▲ 6 It should create critical mass through ambition and scale
- ▲ 7 The project should be capable of leveraging external support and securing matching funds from industry
- ▲ 8 We expect a time horizon of at least 3-5 years
- ▲ 9 International collaboration is welcome and encouraged
- ▲ 10 The work should help develop partnerships with universities, institutes, businesses, government agencies and others

This competitive call went out to staff at UWS in the summer of 2016, with allocation of funds expected in the 2016/17 session.

The UWS difference. A multi-disciplinary ethos in action.

Just two examples of the University's collaborative, multi-disciplinary approach:

Page 40 — our scientists and engineers are developing world-leading infrared linear optical filters for use in healthcare, oil and gas production, food security and pollution control.

Page 25 — a partnership with Oxfam which challenges existing patterns of research relationships to make a real and immediate difference to local communities.

Almost everything we do has an effect on our health, or on the health of others.

Globally, a traditional focus on medical intervention and treatment is broadening to encompass health promotion, disease prevention and improvements to the quality of life. From the built environment to air quality, from psychology to food science, it all impacts on health.

At UWS our holistic, multi-disciplinary approach makes us particularly strong in the science and business of health.

We're involved in primary medical research into diseases like cancer, herpes, arthritis, tuberculosis and COPD lung conditions. Our School of Health, Nursing and Midwifery is exploring ways to deal with dementia in later life, and working with UNICEF on maternal health. Our engineering and computing colleagues are developing software for telemedicine and other clinical applications. And our physicists are developing innovative approaches to accelerating the growth of stem cells. We're also involved in projects like microplastics work, where research that falls principally into the environmental and sustainability field also has significant implications and potential benefits for human and animal health.

By identifying therapeutic targets or developing ideas on policy and practice, we build teams of people across many disciplines who can work towards common goals. This approach means we can have an immediate and beneficial effect on health at regional, national and international levels.

The University's research and enterprise hub acts as a point of engagement with local and international communities, working collaboratively to address the burden of disease and ageing populations across Scotland and beyond. Amongst many other projects, we're working on the mechanisms of disease, discovering new bioactive agents, and exploring the impact of exercise.

Our key expertise in fields such as biochemistry, biomedical science, molecular and medicinal science is clearly part of the world of health. Other capabilities in environmental science, mechanics, engineering and sport performance can have an equally dramatic impact on the work we do for health and wellbeing. It's by combining these strengths in a multidisciplinary and collaborative approach that differentiates UWS.

OUR UNIQUE APPROACH
TO RESEARCH AND ENTERPRISE
ACTIVITIES IN:

HEALTH



Alzheimer Scotland
Action on Dementia

to become Scotland's first 'Dementia Friendly' University, and in recognition of our work in developing the nurses of the future, we were awarded Best Educational Initiative at Scotland's Dementia Awards. At the forefront of recognising the human rights of people with dementia, UWS endeavours to ensure they are treated with dignity and respect. We're making change happen. Change for good.

In partnership with Alzheimer Scotland, UWS operates the Alzheimer Scotland Centre for Policy and Practice, a centre of excellence dedicated to advancing dementia policy and practice through education, applied research and enterprise. The Centre's mission is to support and promote collaborative work between people with dementia and family carers and the scientific and practice communities in order to achieve local, national, European and international impact. Best practice in care is complemented by medical device technology, data acquisition and analysis, environmental psychology, sport and exercise, and approaches to dementia in the workplace.

THE G8 COUNTRIES WANT TO CONQUER DEMENTIA IN 15 YEARS' TIME

AT UWS, WE'VE ALREADY STARTED WINNING

At University of the West of Scotland our work in recognising and responding to the needs of those whose lives are affected by dementia continues to break new ground – and challenge old fashioned pre-conceptions. Dementia-related teaching is now deeply integrated into our nursing curriculum. Our role in the implementation of Scotland's national dementia strategy is key, and we have established the Alzheimer Scotland Centre for Policy and Practice – a centre of excellence in advancing dementia policy. As a result of this work, we have been chosen as the educational partner in the government's Dementia Champions Training Team, alongside Alzheimer Scotland and the NHS. We are on track

NANOKICKING STEM CELLS INTO ACTION

Our bodies' stem cells have a great potential to turn into other kinds of tissue such as blood, muscle or bone, but sometimes they need a little encouragement. Now a collaboration between UWS and the University of Glasgow has developed a novel way of nudging the cells where we want them - and turning them into bone.

The team, led by the UWS Institute of Thin Films, Sensors and Imaging, has developed an ultra-sensitive vibration plate that gives stem cells miniscule bumps. The technique, called Nanokicking, replicates a natural process - when broken bones knit during mending, they vibrate.

As well as helping in the treatment of breaks and fractures, the patented technology underpinning Nanokicking could help develop new treatments for osteoporosis and other conditions. Although it's at an early stage it's hoped the technique, unveiled at the Royal Society Summer Science Exhibition in London, will be ready for testing on people within three years.



TOO YOUNG TO DIE - CONFRONTING EXCESS MORTALITY IN SCOTLAND

The poor health and life expectancy of populations in post-industrial towns and cities is well-known. However, Scotland shows an abnormally high rate of excess mortality - a death rate higher than we'd expect from relative levels of socioeconomic deprivation. Scotland records rates of premature mortality 20% higher than England and Wales, and the phenomenon is at its worst in Glasgow where the rate is close to 30% - considerably higher than comparable cities like Liverpool and Manchester.

Along with Glasgow's Centre for Population Health, NHS Health Scotland and University College London, the University published 'History, Politics and Vulnerability' in May 2016. This report analyses potential explanations, gathers data from new research projects and focuses on a new synthesis of evidence.

This groundbreaking work offers explanatory models for both the City of Glasgow and the nation of Scotland. Looking at historical levels of deprivation, overcrowding, de-industrialisation and demographics, as well as the effects of regional policy and town planning from the late 1950s onwards, the report delivers a list of clear, practical implications for housing, local authority action and national economic and social policy as well as health. A key point is that while the report identifies ways to address existing problems, it also looks at strategies to mitigate against future vulnerabilities likely to emerge from UK government changes to social security and reduced public spending.

Applying history and social science through a rigorous analysis of evidence, the report challenges policy makers and demands an appropriate response in order to improve the health of Scotland's population. It's an example of the University's commitment to thinking and acting differently - and combining disciplines and approaches to make a positive difference to society and health.

THE
MORTALITY
RATE IN
SCOTLAND IS
20% HIGHER
THAN
ENGLAND
AND WALES

MEDICAL NEED OR SCIENCE - WHICH COMES FIRST?

A NEW APPROACH TO OSTEOARTHRITIS

One approach to developing new therapies is to look at a problem and then work back to the cause, enlisting the help of different disciplines and specialisations as you go. This is how the Centre for Musculoskeletal Science has examined how cartilage, bone and the immune system influence osteoarthritis, and its findings are likely to significantly influence future therapies.

Osteoarthritis is a very common and painful condition that affects joints like hips, knees, hands and feet. It occurs when soft protecting tissue thins and roughens, leaving the joint without the natural cushion that normally separates the ends of bones. It particularly affects people in their late forties and upwards, but damage caused earlier - for example in sports injuries - may cause or exacerbate the problem later in life.

For decades it's been accepted that cartilage deteriorates with age, leading to stress on the bone. One revolutionary finding by our UWS team is that in many cases the bone changes before the cartilage - which turns our way of thinking about the disease on its head. Work on protease-activated receptors (PARs) and the role they play may lead to a significant breakthrough in our understanding of the disease.

Osteoarthritis represents a significant unmet medical need - joint replacement and other treatment is a major drain on health services around the world, and the condition has a negative impact on quality of life for hundreds of millions of people. There is as yet no way of curing osteoarthritis, but with established proof of concept, our work may be in clinical trial within a few years.

This collaborative, inter-disciplinary approach is key for the University's Institute of Biomedical and Environmental Health Research (IBEHR). IBEHR looks at human beings and their place in the world, addressing core issues in health and disease and the wider picture of human impact on the environment.

FIGHTING HERPES WITH A NEW SYSTEM OF STUDY

Chickenpox, coldsores, shingles, glandular fever. The herpes family of viruses affects most of us and when we're infected, it's for life. That's because all eight human herpes viruses have the ability to establish lifelong persistence or latency - 'hiding' in the body with the possibility of reactivation at a later point. But so far we don't understand this latency that well, and the field is relatively under-researched.

Work in the University's School of Science and Sport is currently unique in the world. Collaborating with the MRC Centre for Reproductive Medicine in Edinburgh, stem-cells are being used to manipulate neurons which can then be used as tools to act on cells. The aim is to find what links neurons to viruses, with the hope that primary research will lead to a major breakthrough in treatment in years to come.

With strong industry links and an approach which aims to provide real-world benefits, the University aims to make advances in knowledge accessible and tangible for society, quickly and effectively.

A VISIONARY DEVELOPMENT IN EYE HEALTH

Contact lenses are an ideal environment for a whole biosphere of tiny organisms. The average user will never be aware of them as most are entirely harmless, but there are a few which are less benign, and which can cause problems. A nationally-recognised study by UWS School of Science & Sport has focused on Acanthamoeba, a parasite which can cause severe, sight-threatening eye disease. The study - a collaboration with the University of Strathclyde - aims to prevent potential blindness by inhibiting the essential metabolic pathways of the parasite.

RAISING THE GAME

Working with partners in Brazil, China, Australia and the US, academics from the UWS Institute of Clinical Exercise and Health Science are gaining global recognition. Projects have been undertaken for the Scottish FA, Welsh Rugby League, Scottish Government, the International Olympics Committee, USCAA and USA Track & Field. Recently we've looked at performance enhancement for athletes competing at high altitude, and short-term, intense exercise as a training strategy.

- ▲ Working alongside several universities in the UK, Australia and the US, our researchers recently published a groundbreaking study in the British Medical Journal's 'Open Heart' that turns common assumptions on their head. The study's randomised controlled trials did not support dietary fat guidelines, and found no association between fat intake and death from coronary heart disease.
- ▲ UWS research has revealed that beetroot juice boosts athletic performance at altitude, with findings published in the journal Medicine and Science in Sports and Exercise.
- ▲ UWS research reveals that sunlight combined with nitrate-rich foods improve athletic performance.
- ▲ The University's Institute of Clinical Exercise and Health Science has been invited to become part of an international research group with colleagues at Yale University and the University of Texas to investigate the diabetes genome, obesity and adolescents.

A POWERFUL ANTI-SEPSIS TOOL IN YOUR POCKET

Sepsis kills 37,000 people every year in the UK - more than lung cancer - and is our number one cause of maternal death. It arises when the body's response to infection damages its own tissues and organs. Reducing the mortality rate from sepsis is a priority area of the Scottish Patient Safety Programme.

A UWS team working in collaboration with NHS Greater Glasgow and Clyde and NHS Education for Scotland brought clinical, design and computing skills together to create an app to help medical staff recognise and respond to the onset of sepsis. As a smartphone app, the Sepsis Screening Tool goes anywhere the doctor or nurse may be, and can be brought into play in seconds.

Features of the app include an early-warning scoring system, a screening function, an outline of the Sepsis 6 care bundle and an algorithm which indicates when to escalate care for the individual patient. Launched in 2014, the app has already led to a 21% drop in sepsis mortality and is now being rolled out in England and Wales and overseas.



MAKING DIGITAL THEORY WORK FOR THE REAL WORLD

Developing apps, games, web platforms and tools for demanding private and public sector customers, the Scottish Centre for Enabling Technologies at UWS gives students direct experience of real commercial projects. SCET is a great example of the University's commitment to the kind of useful, practical work that can make an immediate and tangible difference, both commercially and for the good of society.

SCET has already created computer games, mobile apps, animation and database management systems for over 250 local and national companies. SCET is actively looking for new work and invites enquiries and commissions for real-world, time-sensitive commercial projects.

The Centre is also responsible for significant developments in digital health, collaborating with NHS Scotland to help improve outcomes for patients. Apps and tools have been developed to support palliative care, diabetes monitoring, cancer care and ophthalmology. Mobile apps developed by SCET are already helping to divert unnecessary visits to A&E, and allowing patients with long-term conditions to manage their own treatment.

CHANGING GOVERNMENT POLICY ON INTRAVENOUS DRUG USE

In 2004 a quantitative study revealed that intravenous drug users in Glasgow continued to suffer high levels of blood-borne virus infection, despite the supply of free needles and syringes. A UWS team gained authorisation to film users injecting, and the knowledge gained has been instrumental in changing Government policy and assisting drug workers and social work teams.

The simple yet significant discovery was that paraphernalia other than needles was causing infection. Filters, foils and even water were implicated, and as a result packs including these secondary supplies were prepared and offered free to users. From an initial local initiative, the results have influenced policy across the UK and are now drawing international interest.

BUILDING TOOLS TO FIGHT DISEASE

Developing new drugs is a process that combines design with discovery, and chemistry with biology. Work by UWS Institute of Biomedical and Environmental Health focuses on two key routes to progress - the rational design of new tools, and an exploration of what we could harness from natural sources.

With recognition from various Scottish charities and the Royal Society, as well as extensive collaboration in the UK, Europe, the US and India, the Institute's work is focused on drug discovery in cancer and tuberculosis. Our team is synthesising and evaluating hit-molecules with anti-mycobacterial and anticancer activities. At the same time, bio-active molecules from plants and marine species are isolated, identified and examined.

COUNTING COUGHS FOR SMARTER HEALTHCARE

COPD - chronic obstructive pulmonary disease - is a group of non-cancer lung conditions including emphysema and chronic bronchitis. About three million people in the UK have one of these conditions, and historically the west of Scotland has experienced a higher-than-average rate. Now thanks to our pioneering work, patients can be monitored, unobtrusively and constantly, using their own phones.

A partnership between UWS, the University of Edinburgh and Cirrus Logic has brought together clinicians, software developers and specialists in signal processing, machine learning and artificial intelligence to work on a range of healthcare applications. One of the first projects is Smart Cough - an app which provides robust signal processing of respiratory symptoms. It recognises and counts coughs via Smartphone, dispensing with the need for specialist clinical equipment and allowing patients to get on with day-to-day living.

The project, which received funding from DHI Scotland, was awarded the Jack Perkins Prize in 2015 by the Institute of Physics and Engineering in Medicine. UWS academics are working with the Institute of Population Health Science at Edinburgh University, and multi-national industry partner Cirrus Logic.

INTERDISCIPLINARY APPROACHES IMPROVE FISH WELFARE

An interdisciplinary team working in partnership with industry leaders (Mars UK-Waltham, Pets at Home and Skretting) is focussing on how natural and anthropogenic environmental effects can impact on the behaviour and physiology of aquatic organisms.

With important lessons for fish welfare, conservation and predicting the effects of change, a number of exciting new areas are being explored including the establishment of new fish communities on artificial coral reefs, the welfare of ornamental fish during transport, and shrimp feeding behaviour.

A VICTORY IN THE WAR AGAINST CANCER

The war on cancer is fought on many fronts, but work at UWS has achieved a significant win in a key area. Senescence is the process that stops the proliferation of damaged cells, and has the potential to help control cancer. A UWS molecular biology team has effectively discovered a mechanism which stops cells dividing.

However, senescence has side effects, preventing some cells from functioning normally. Cellular senescence is thought to cause ageing, so our lab work is looking at both cancer prevention and age promotion, providing a new perspective on a whole range of age-associated diseases like arthritis. A research paper on the initial findings has been published, and findings have been presented at the Houses of Parliament.



How can we create a fairer, more secure, more cohesive society in the decades ahead?

How do we enable citizens to grasp opportunities while protecting the vulnerable? How do we recalibrate public sector systems and services to serve the needs of the 21st century? These are questions faced by social scientists, economists, historians and political scientists. They're also inextricably linked with issues around health, sustainability, science and technology, the media and creative industries and other aspects of life and work.

At UWS, our research spans a wide range of topics which come under the broad heading of 'society', however most of the projects detailed in this section touch on health and sustainability too bringing together researchers from a wide range of disciplines. We're also collaborating with external public and private sector organisations as diverse as the NHS, Oxfam and Portugal Telecom.

At home in the West of Scotland, in Europe and the world, society is changing. An ageing population, evolving patterns of employment, new patterns of migration and the impact of technology are all presenting challenges and opportunities. The interdisciplinary, collaborative approach of research teams at UWS is helping us make a positive difference, day-by-day and year-by-year.

OUR UNIQUE APPROACH
TO RESEARCH AND ENTERPRISE
ACTIVITIES IN:

SOCIETY

THE DIGITAL COMMONWEALTH

The 2014 Commonwealth Games in Glasgow brought unprecedented opportunities for individuals and community groups to get involved. The UWS Digital Commonwealth project - supported by a Big Lottery Fund grant - gave people the tools to explore and tell their own stories around the Games.

The project used accessible mobile technology and social media to get as many people as possible to cover key events. It included six weeks of citizen reporting on the Queen's Baton Relay as it made its way around the country ahead of the opening ceremony. As well as producing the largest digital resource ever amassed around an event of this size, the project raised skills, capabilities and media literacy in communities and schools throughout Scotland.

Again in the wake of the Games, UWS won gold in the Game Changer Awards for the research impact of its project, Leveraging Para-sports Events for Sustainable Community Participation.

UNIVERSITY STUDENTS HELP TAKE ST MIRREN TO THE WORLD

A unique link up between St Mirren Football Club and University of the West of Scotland (UWS) saw students broadcast live footage of the club's games to the world. St Mirren TV is entirely run by students taking courses in sports journalism, journalism, broadcast production and filmmaking at the University. The online TV station operates alongside St Mirren Radio, which is also run by UWS students.

POVERTY, POLICY AND ACTION

THE UWS-OXFAM PARTNERSHIP

Launched formally in 2012 following several years of successful collaboration, the UWS-Oxfam Partnership is a highly innovative model of research and knowledge exchange. Combining the University's academic strengths with the campaigning skills of one of the world's best-known charities, the partnership involves a wide range of local groups from communities throughout the west of Scotland. It provides a valuable channel for student engagement, leading to both voluntary work and professional careers.

The aim of the Partnership's diverse activities is to inform public debate on the future of Scotland. It has examined long-standing issues of inequality, poverty, social justice and sustainability, gathering impetus around Scotland's 2014 independence referendum and its aftermath. To date the Partnership has produced work on the integration of refugees, the economic contribution of co-operatives, the work of community organisations and the impact of austerity on health.



POSITIVE CHANGE IN CARE HOMES FOR OLDER PEOPLE

With an ageing population and changing social patterns, more people are living in care homes for longer, putting the sector under increasing scrutiny. My Home Life is a national initiative founded to carry out research, influence policy and inform practice, ultimately making care homes better places in which to live, die, visit and work.

The programme - really a social movement - has a philosophical ethos led in part by UWS and its Scottish partners, with the University's Institute of Care and Practice Improvement acting as lead for My Home Life Scotland. Strands of work include policy development around what the sector wants and needs; research that works with people rather than simply on them; and enabling care homes to co-create research and own the outcomes they produce. Two key areas which have already been influenced by My Home Life are the inspection process - where there is a focus on promoting positive relationships - and Appreciative Enquiry, a new model for engaging patients, staff and relatives.

Active in England, Wales and Northern Ireland as well as Scotland, the programme is now about to launch in Australia. It has been nationally recognised in government reports and has a tangible and growing impact on the way the sector is run.

WHEN GAMING BRINGS SERIOUS BENEFITS

UWS is an established global player in a particularly exciting area of the games industry - Serious Games. This is where the phenomenal power of computer games is applied to real-world problems and opportunities in fields like health, social work and education.

The University's Scottish Centre for Enabling Technologies has contributed to a significant number of EU-funded projects, some of which are already shaping policy and practice change. Apps and games have ranged from a virtual reality game for health and safety around scaffolding, to the Keep Me Safe programme, which helps people with mental health issues stay safe online.

As well as these 'serious' applications, work has seen psychologists collaborating with colleagues in careers guidance and computing disciplines to look at the psychology, methods, research and statistics behind entertainment games.

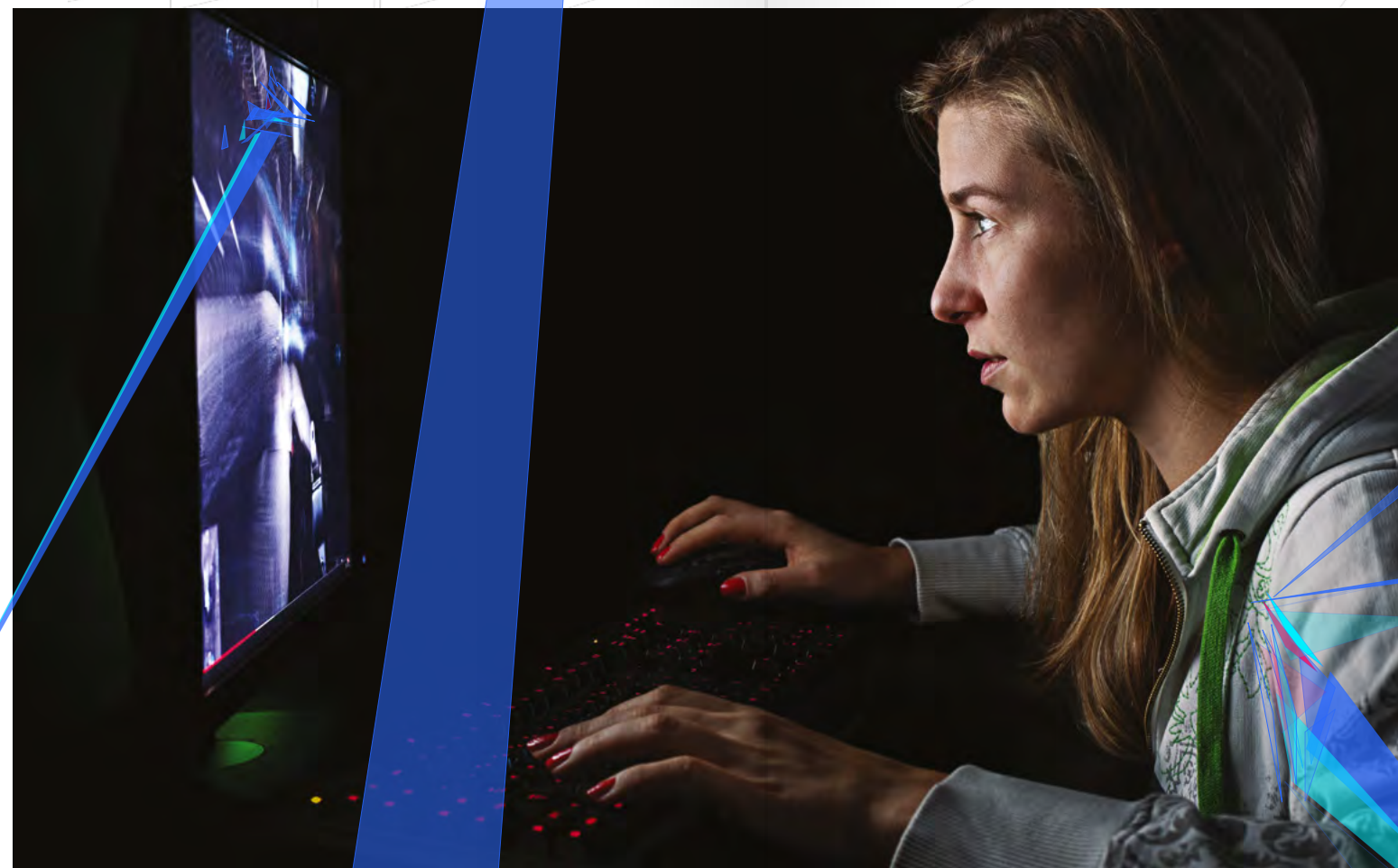
BACK TO SCHOOL IN ARCHITECTURE AND DESIGN

The built environment inevitably affects the way people behave, and there's a great deal of anecdotal evidence that some school buildings work better than others in terms of academic performance, discipline and the overall happiness of students and staff. However huge budgets are still spent on the fabric of schools with no solid evidence on the value or contribution of design on function.

Now UWS psychologists are leading an interdisciplinary team to provide proper, scientific data that can be used to evaluate performance and inform future policy. Educationalists and architects are contributing to the work - led by the UWS School of Media, Culture and Society - with funding coming from local authorities and Design Scotland.

The approach is based on identifying features and qualities that have a positive impact on motivation, engagement and performance, and is leading to the repurposing of space within existing buildings - as there is currently little capital for new build in the Scottish school system. Where findings have been applied, pupils have adopted more effective learning strategies and shown more inclination to help their classmates, while teachers have reported higher levels of job satisfaction.

Work has also been applied to the healthcare sector with engagement from healthcare professionals, where design can help create more therapeutic environments. Profound and dramatic effects have already been recorded for individual patients.



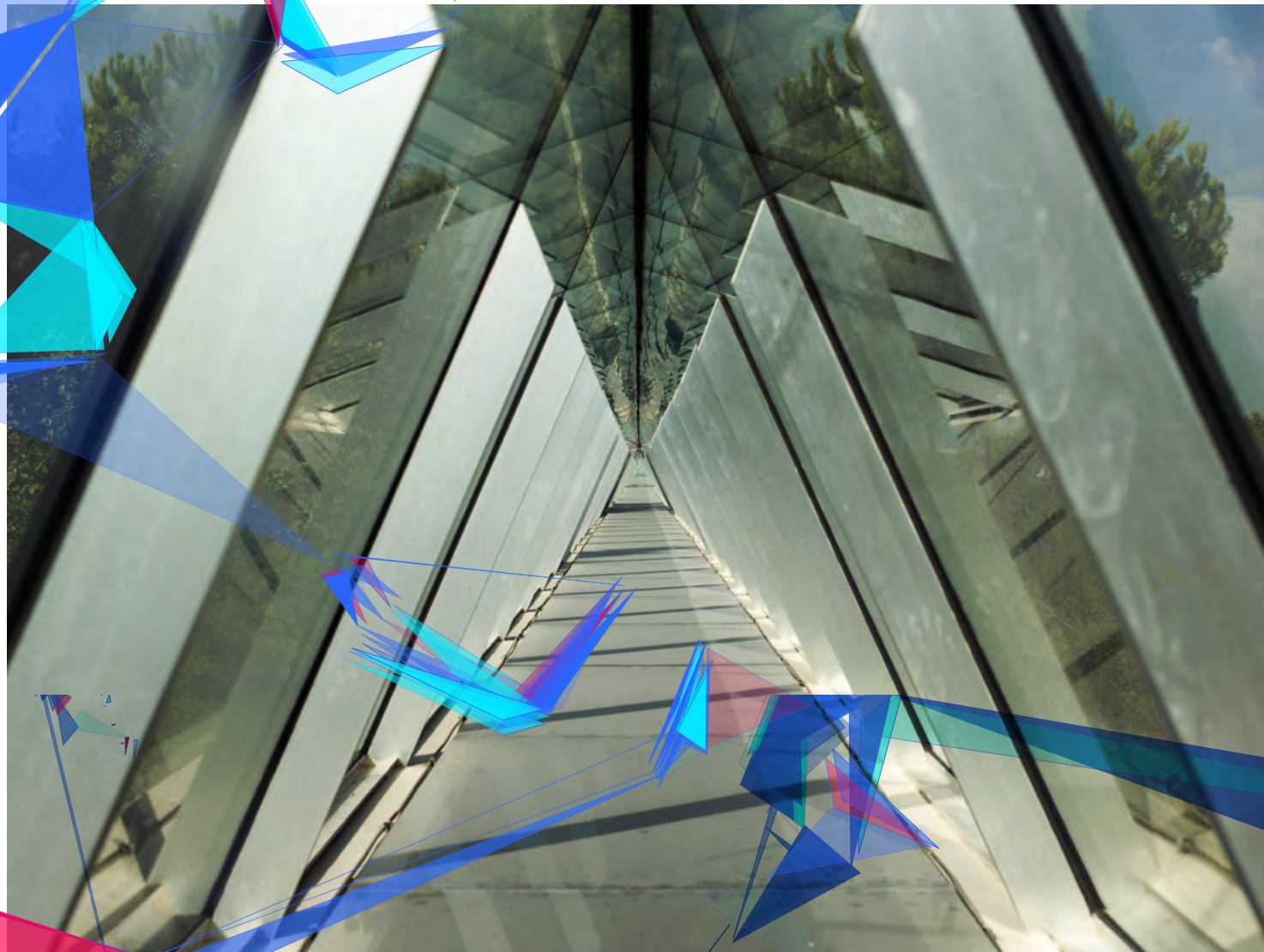
CHANGING LIVES THROUGH PARTNERSHIP WORKING

In the Schools of Education and Media, Culture and Society, academics are working collaboratively to apply sociological, criminological and educational inputs to address issues of physical activity, well-being and crime reduction.

Working with Scottish police officers, the prison service, youth workers and teachers, policy is being shaped and lives are being changed.

With young people's desistance from crime, and especially knife crime, communities and families are safer and happier places to live.

This work has expanded into CPD training and a spin-out company opportunity (see page 40).



YES TO BETTER LIFE SKILLS

The Youth Yes project is a smart game designed to help young people aged between 17 and nineteen make decisions about their future careers. Currently at evaluation stage, the game is a collaboration between a team at UWS and academic colleagues in the Netherlands, Romania and Iceland - with the gaming approach used to unite different cultures.



YAD VASHEM HALL OF NAMES
BELOW : DAVID SHANKBONE [WIKIMEDIA COMMONS]



TEACHING THE UNTHINKABLE

UWS is a pioneer in the field of Holocaust Education, and the first institution in Scotland to bring the topic into primary teacher training.

Since 2011 the University has jointly delivered its Holocaust Studies and Citizenship course with the International School at Yad Vashem, the World Holocaust Remembrance Centre in Jerusalem. UWS next stages will be the development of online modules, a new teaching module in Controversial Issues in Citizenship, and a Vision Schools programme supported by Education Scotland.

The future belongs to all of us. Developing technology, practice and policy which makes that future more secure and sustainable must be a key goal for research in a wide range of fields and disciplines.

As a practical, modern University where the focus is on identifying specific outcomes and achieving defined goals, UWS research is working towards sustainability in many areas. We're active in construction, fuel technology and cloud computing for example, and looking at ways to monitor soil properties and water flows using novel technologies. Like much of what we do, our work in sustainability unites multi-disciplinary teams and collaborators from other public and private sector organisations, including Scottish Government and Scottish Enterprise, a number of health boards, universities in Europe and China, and commercial organisations such as Thales Optronics, Peak Scientific and Barr Environmental.

Sustainability is about the big picture - about excellence in design, the application of cutting-edge technologies, and embracing the emerging ethos of a circular economy. Even the work we do which doesn't have an immediate or obvious impact on the environment - such as in our Schools of Health, Nursing and Midwifery, or Media, Culture and Society - will have implications for the future of society and how that impacts on the world around us. Both directly and indirectly, our work is contributing to a more sustainable and vibrant future.

OUR UNIQUE APPROACH
TO RESEARCH AND ENTERPRISE
ACTIVITIES IN:

SUSTAIN- ABILITY

LEADING EUROPE INTO THE 5G FUTURE

A project team made up of 12 EU partners and led by UWS is spearheading the implementation of Europe's 5G mobile network. Approximately 1000 times faster than 4G, the new technology has significant implications for future applications such as remote surgery, self-driving cars, smart cities and remote monitoring. Perhaps the biggest initial impact will come in remote areas where fixed networks are prohibitively expensive, but with the development of the Internet of Things, 5G will impact on all our lives soon.

The UWS team are Co-Principal Investigators and Co-Technical Managers of the consortium, which includes major industry partners like Portugal Telecom, highly specialised SMEs, and renowned universities and research centres in seven countries. The three-year project - called SELFNET - is exploring approaches to advanced automation of complex network management operations. A key aspect is 'self-healing', whereby the network will be able to protect, correct and optimise itself, saving on expensive and time-consuming manual maintenance and repair.



The only Scottish university involved in the work, UWS is the technical leader on the €6.8 million SELFNET project, which is funded by the European Commission to explore next-generation mobile networking technologies under the Horizon 2020 research and innovation framework.

€6.8
MILLION
EU
PROJECT

USING OUR RESOURCES TO MAKE A DIFFERENCE

THE CENTRE FOR AFRICAN RESEARCH ON ENTERPRISE AND ECONOMIC DEVELOPMENT

Paisley may seem an unlikely hub for African business, but the University's Centre for African Research on Enterprise and Economic Development is providing research, support and executive education at the highest level from right here in the West of Scotland.

There are several academic centres for African studies in the UK but CAREED is unique in its focus on enterprise. Established in 2015, the Centre builds on decades of experience in Africa and exceptional links with business and government leaders throughout the continent.

Work will initially focus on five key areas of interest; commodities and exporting, enterprise and entrepreneurship, logistics and supply-chain management, governance and ethics, and microfinance and social business. These areas reflect the current interests of academic staff and will be refined or added to as the Centre develops new relationships with businesses, governments and NGOs.

CAREED reflects the University's ethos of using our resources in innovative and constructive ways. Initially a happy accident, the initiative arose from mutual interests and strengths with a number of fellow academics. Now the Centre has twelve members of staff and a large number of PhD students, including a significant number from Africa. At a time when the African continent is on the move economically, it puts us in a great place to make a significant and beneficial contribution.

A PHOENIX FROM THE ASHES - SAVING ONE OF SCOTLAND'S MOST ICONIC BUILDINGS

The catastrophic fire at Glasgow School of Art in 2014 has inspired experts from all over the world to pool resources and work together for its restoration. A UWS team is playing a key role by investigating the effects of the blaze on the surfaces and composition of stonework. Working with Historic Scotland and partners from Italy, Greece, Germany, France and the US, the team is using petrographic analysis of stone, concrete and historic mortars using optical and electron microscopy.

As well as assisting with the conservation and repair of Charles Rennie Mackintosh's masterwork, the research promises to provide important new knowledge which will help inform future heritage conservation projects around the world.



SHAPING FUTURE STRATEGY ON ENVIRONMENTAL IMPACT

China's unprecedented industrial development has seen massive contamination of landscape through years of unrestricted mining, poor waste management and other negative influences. The impact of contamination impinges on the food chain and production of key crops such as rice. By looking at the chemical conditions of the environment UWS's Centre for Environmental Research is working with Hunan University of Science and Technology and local government in China to use sustainable technologies to improve conditions and raise awareness of environmental issues.

Now a joint cross-disciplinary research project between UWS and University of Strathclyde is studying the evolution of anti microbial resistance in the environment to understand how severe pollution affects the ability of living systems to combat disease, vital to secure and sustain healthy living environments for all species.

MACRO ANSWERS TO MICROPLASTICS

Tiny fragments of plastic are prevalent in the world environment. The devastating effects on our oceans - specifically on seabirds and marine life - have drawn a good deal of media attention, but the threat of microplastics as an emergent pollutant is actually much wider, with impacts on soil and air as well as water.

Microplastics make their way into the environment through deliberate use and discard - in forms such as shower gels and blasting beads - and secondary waste. Work led by the University's Centre for Environmental Research is now helping us understand the impact on organisms and human health, and on the global economy.

Working with Marine Scotland, Scottish Environment Protection Agency, private companies and regulators, UWS is conducting novel research that should lead to better awareness and treatment, and eventually a reduction in levels of plastic entering the waste stream.

PUTTING A KEY SCOTTISH INDUSTRY IN BETTER HEALTH

With the salmon and trout industry worth over £1billion a year to Scotland, fish health is an economic priority as well as an environmental concern. Now multi-disciplinary, industry-led research from UWS is combining science and engineering to address fish mortality and economic loss.

The UWS team is applying lessons from human diagnostic processes to large-scale fish sampling. While traditional diagnosis of disease in fish can take two to three weeks from the appearance of visible symptoms, new techniques will allow farmers to process up to 400 samples per hour, giving early indication of any potential problems. A related but separate study will use physiological comparison to address stress factors in fish, again with significant potential welfare and economic benefits.

GOOD FOR HUMANS, GREAT FOR ANIMALS

In partnerships with the NHS, Benchmark Animal Health and Cefas (Centre for Environment, Fisheries & Aquaculture Science), the UWS Institute of Biomedical and Environmental Health is developing pharmaceuticals for human use, aquaculture and animal health. The work also has significant implications for the environment, as it touches on climate change, biodiversity and microplastics. The team leads work with several local businesses which is helping to develop drugs, improve point-of-care diagnostics, and identify the antimicrobial properties of soaps.

AN ONLINE ECOSYSTEM FOR THE BUILT ENVIRONMENT

A large building is a complex entity, with construction, use, maintenance and repair potentially involving dozens of organisations and hundreds of people. So huge amounts of data are generated, from conception and planning through to daily life once the project is completed. If all that information were brought together and made accessible through one single source, it would constitute an enormously valuable tool in monitoring, assessing and managing the ecosystem of the building.

That's the thinking behind BALI - a Built Asset Life-cycle Intelligence platform under development by UWS School of Engineering and Computing. Working with industry partner Whole Life Consultants and with £87k funding from Innovate UK, a Feasibility Study has been completed and a demonstrator produced which works on laptops, PCs and smartphones.

An example of the UWS approach of responding to an industrial or societal demand, the technical feasibility of a cradle-to-grave solution is now proven, and the partners will continue to work on the technology while examining commercial viability. Bringing human and digital data gathering together along with developing artificial intelligence and the Internet of Things, the platform will allow access to huge data sets. These in turn will allow greatly improved location of services while informing processes and supporting decisions.

GETTING MORE FOR LESS - INCREASING BIOFUEL YIELD

Biogas plants are becoming increasingly established and important in Scotland, particularly in remote and rural communities on the mainland and islands. So a UWS project which shows an increase of more than 20% in yield from organic waste could soon make a big difference to the efficiency and viability of the new technology.

A Hollander beater - a machine developed to produce paper pulp from plant fibres - has been used in the pre-treatment of organic waste, algae, food and waste-water sludge. The process has achieved dramatic yield increases, and further design improvement is expected to boost efficiency even further.

In a complementary £500k project, UWS staff are examining the cell structure of micro-algae to optimise pre-treatment and chemical processes to produce more efficient biodiesel fuel.

Also within the sustainability theme, UWS engineers are working to improve efficiency and reduce costs in the design of electrolyzers and fuel cells to enable stand-alone storage systems for wind and solar generation.

These projects are examples of UWS contribution to the circular economy, local industry, and a sustainable future.

HYPERSPECTRAL IMAGING TAKES OFF

Hyperspectral imaging collects information from across the electromagnetic spectrum, with important applications in astronomy, biomedical imaging, geosciences and agriculture. Unfortunately most hyperspectral cameras are large and heavy, making them difficult or prohibitively expensive to use in many cases.

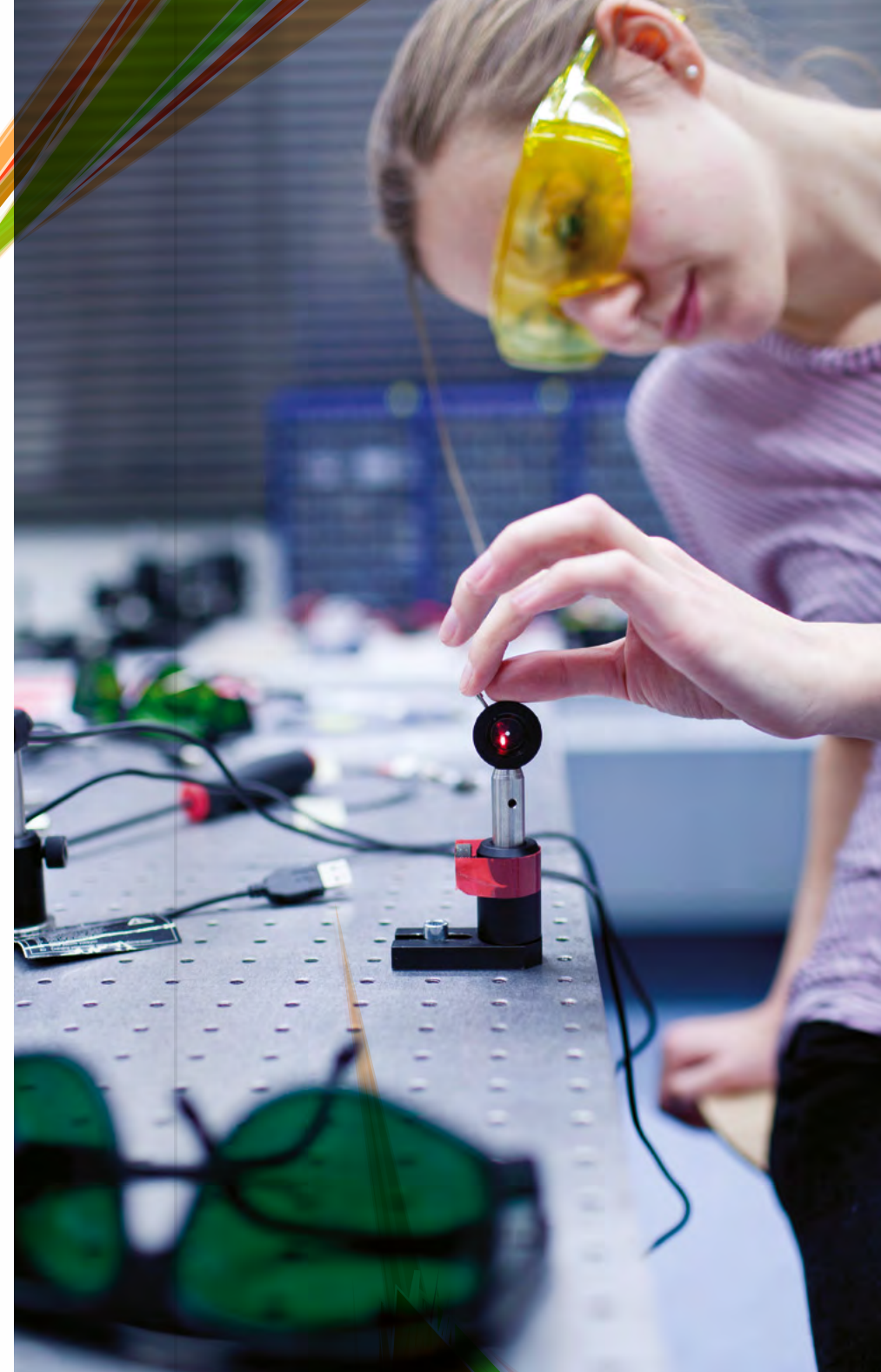
A UWS partnership with Zhejiang University in China and Thales Optronics UK is using thin film technologies to develop miniature hyperspectral cameras. Like the small, light optical cameras we're familiar with, the new equipment can be transported by automated vehicles or flown into the sky by drones.

The approach is being applied to monitor soil properties and water flows to prevent flooding, and offers potential in solving a number of challenging research problems including real-time processing of large scale datasets.

SOFT MACHINES

A UWS team is developing soft materials to perform exceptionally hard functions. Focusing on conductive organic materials, the work could lead to the creation of diagnostic sensors and tools for detecting explosives, as well as for drug discovery.

Combining physics with chemistry and working with thin films and crystalline materials, the team is working with several other institutions across Scotland and the UK to develop a toolbox of materials. Along with the University's Centre for Environmental Research, the group is also providing industry consultancy in water treatment for the distillery industry.



UNDERSTANDING THE BUILDING-BLOCKS OF NATURE

The structure and properties of atomic nuclei are fundamentally interesting for science. But advances in nuclear physics have real, useful and sometimes surprising applications.

The Nuclear Physics Research Group at UWS has a number of established research programmes, including a key area of expertise in gamma-ray spectroscopy, and we're leading experimental programmes at CERN and other facilities in Finland, Italy and France. Outside of fundamental research, our expertise in this field is contributing to advances in medical physics and imaging, environmental monitoring, nuclear forensics and the energy sector.

CHANGING HOW THE WORLD WORKS

UWS research has a significant impact on many aspects of everyday life. One area where we've had particular success is in the work of the Institute of Thin Films, Sensors and Imaging. Along with partners such as DuPont Teijin Films and Plastic Logic, our team has helped to develop coatings for high-powered laser systems, anti-erosion coatings for oil and gas applications, optical filters for medical use, deformable mirrors for shaping laser beams, and imaging to detect early dental decay. These advances are already in use on a daily basis, benefitting industry, society and the lives of ordinary people around the world.

ENABLING EXCELLENCE

UWS has a vision and mission to grow world-class research and to ensure that this research underpins our programmes and is accessible to local, national and international partners through knowledge exchange and enterprise services.

Our strategic priorities focus on three main research and enterprise themes that reflect challenges facing modern society. Our staff work across three broad themes, but our main focus is on inter-disciplinary and multi-disciplinary approaches to Health, Society and Sustainability. Activities span these broad themes, as well as the disciplines that fall within them.

Our horizons are global and we deliver world-class research, but our primary focus is on working with local partners from across the University's five campuses in Scotland and London. Partners are able and welcome to access our student base, both to engage with student projects and for potential recruitment. We want UWS to be embedded in the community, working in partnership with schools and colleges, and businesses of all sizes and scales. Our aspiration will be to share facilities and expertise for mutual advantage, with UWS experts integrating with your business or organisation.



Enterprise Services has a dedicated team of staff working to help businesses access our expertise and resources for feasibility studies, problem solving, consultancy, R&D, training, analysis and testing. We work with organisations of all sizes, across public and private sectors. Amongst other support, we provide:

- ▲ Opportunities for continuing professional development and training, delivered on an open or bespoke basis, at the University, on your premises or at any other location
- ▲ Consultancy services including expert witness, problem-solving, feasibility studies and technical analysis services
- ▲ A Knowledge Transfer Partnership scheme
- ▲ The Scottish Funding Council's Innovation Voucher scheme
- ▲ Support for entrepreneurs to build companies, protect intellectual property and commercialise their innovations
- ▲ Involvement by UWS students and graduates to help develop client organisations
- ▲ Conference, events and meeting facilities
- ▲ Access to University-developed Intellectual Property on a licence-basis

ENTERPRISE & EMPLOYABILITY SERVICES AT UWS



COMMERCIALISATION AT UWS

At UWS we aim to be Scotland's most entrepreneurial University. Our students are exposed to a range of entrepreneurial activities through collaborative working with the Scottish Institute for Enterprise and our own vibrant Enterprise Academy. Our Aspire Hub offers a range of commercialisation support, and we actively participate in the Scottish Funding Council Converge Challenge Programme. We also encourage and incentivise staff to consider spin out and commercialisation opportunities as a route to impact for their world-class research. Here is a small selection of our current activities.

▲ Utilising patented technology for linear variable filters. UWS is creating a spinout company, with support from the Scottish Enterprise High Growth Fund, around Infra-red spectrometers, with applications for sensors and imaging. The aim is to produce low-cost wirelessly deployable gas sensors for inline monitoring for the food and pharmaceutical industries.

▲ The Thin Film, Sensors and Imaging Research Institute is exploring low-cost, thin film ultrasonic transducers for non-destructive sensor imaging for medical applications, deposition and design. This patented technology, again supported by the Scottish Enterprise High Growth Fund, aims to develop multispectral imaging for agricultural applications such as crop analysis, hydration, harvesting and feed requirements. These low cost filters will have wide applications, from plant monitoring and food security through to anti-counterfeiting measures associated with fake art and banknotes.

▲ UWS, along with partners including Wideblue Ltd, University of Strathclyde and the James Hutton Trust, is working with Sharp Research laboratories in Oxford on an Innovate UK project on energy harvesting and scavenging energy from light. The project uses thin films and rechargeable batteries to power autonomous sensors in buildings.

▲ The University's Crime, Justice and Policy research unit and School of Science and Sport are working together to develop a planned spin-out company, Comeback Scotland. The company will aim to reduce social exclusion, crime and reoffending.

EMPLOYABILITY AT UWS

UWS's new research and enterprise strategy will create an engine for growth, significantly enhancing the success and employment prospects of our students. More and better research, industry engagement and income generation will benefit us all.

To implement this strategy, we're developing a new enterprise and employability unit focused on engaging with industry. The unit will manage both demand and supply of students, learning what businesses want and need from us and putting forward suitably talented and prepared students to fill those requirements.

By putting industrial needs at the heart of UWS, we're creating a uniquely practical, relevant and responsive offering. Every student will have access to work experience, with an embedded partnership model based on understanding business needs.

SUPPORT AND STRUCTURE - THE UWS GRADUATE SCHOOL

UWS provides exceptional research opportunities. Our multi-disciplinary, collaborative approach and close ties with industry support a unique culture in which students from diverse backgrounds can thrive and achieve their potential.

The UWS Graduate School plays a key role in supporting postgraduate research students. Through training courses, seminars, competitions and interdisciplinary programmes, the School encourages researchers to look beyond the boundaries of their disciplines and develop skills relevant to a wide range of careers.

Currently UWS has around 450 research students from more than 20 different countries working in a range of postgraduate programmes. Research degrees available are:

- ▲ Doctor of Philosophy (PhD)
- ▲ Master of Philosophy (MPhil)
- ▲ Master of Research (MRes)
- ▲ Doctor of Business Administration (DBA)
- ▲ Professional Doctorate (DProf, EngD)
- ▲ PhD by Publication (PhD)

For more details and a full description of each of these degree programmes, please see the UWS website www.uws.ac.uk/graduateschool

PROFESSIONAL DOCTORATES - DBA, DProf, EngD

Putting theory into real-life work experience to give our students a head start in the competitive national and international job markets in the public, private and third sectors.

Our globally recognised programmes help motivated, high-achieving graduates and professionals to develop their research, analytical and critical-thinking skills. Students focus on taught components of research methodology and professional development before undertaking an in-depth research project that focuses on practical application in a professional environment.

www.uws.ac.uk/graduateschool



OUR STUDENTS' VIEWS

CHIDOZIE OBI-OKOYE

Chidozie Obi-Okoye came to Scotland from Nigeria in 2012, initially studying sound engineering at a Glasgow college before discovering the MA Music: Innovation and Entrepreneurship at UWS, a course designed to help students build careers and businesses within the music industry. With support from the University to get a student entrepreneurial visa and assistance through the Enterprise Campus accelerator programme, after graduating Chidozie then went on to set up a UWS starter company Fingersfingers. His first product Gombolola, launched in April 2016, is a dedicated search and social app that keeps Africans connected with African businesses outside Africa. It shows all the relevant businesses around your physical location, enabling you to connect with them in-app and read profiles, reviews and contact them directly without leaving the app. Gombolola is currently being used in 6 UK cities with a 2-year plan for it to roll out across all major European and North American cities.

“UWS HAS GONE ABOVE AND BEYOND IN SUPPORT OF MY ENTREPRENEURIAL PURSUITS IN SCOTLAND. ONGOING FINANCIAL AND MENTORING ADVICE VIA THE ENTERPRISE CAMPUS PROGRAMME, HAS MEANT I’VE BEEN ABLE TO LAUNCH AND GROW FINGERSFINGERS AS A COMPANY MUCH FASTER THAN INITIALLY PROJECTED”

SAMANTHA YUILLE

Samantha benefited from the support of a multi-skilled advisory team in the Graduate School during her PhD project, enjoying useful practical training alongside her academic work to enhance her skillset. She attended international conferences such as the C. difficile Symposium and the Society for General Microbiology during her studentship, putting talents in public speaking, presentation and networking she developed at UWS into practice. Fully prepared for the world of work during her three years of study at UWS, she quickly secured a research post with a pharmaceutical company after gaining her PhD.

“I’D RECOMMEND PHD STUDY AND RESEARCH AS A CAREER OPTION TO ANYONE INTERESTED IN PURSUING THE VAST SKILL SET AND OPPORTUNITIES THAT ARE OPENED UP TO YOU.”

FIVE FROM LIFE HOW UWS IS WORKING WITH SCOTTISH INDUSTRY

Research at UWS reflects our culture of doing practical, useful work that benefits individuals, businesses and society as a whole. Key to that approach is working with Scottish industry to develop new products and services, exploit competitive advantages and enter new markets. This work is stimulating our economy, creating jobs and making a real contribution to the prosperity of the country. It also provides invaluable opportunities for our students and collaborators. Here are five examples of UWS in action with industry.

▲ SNAP40 is an Edinburgh-based business designing and developing wearable medical devices. UWS helped them develop a device to monitor indicators including respiratory rate, blood pressure, heart rate and skin temperature. The data is transmitted wirelessly to a software platform which detects patterns and trends, automatically notifying healthcare staff when attention is required.

“With some universities there can be issues with IP but with UWS this process was very straightforward.” Christopher McCann, CEO SNAP40.

▲ The world's biggest fish vaccine delivery company, Stirling-based Aqualife approached UWS for help in developing more effective and accurate inoculation systems. On completion and following independent assessment, the KTP project was judged ‘Outstanding’ by Innovate UK - one of a very small percentage of projects to achieve the highest status. Aqualife has now licensed the IP from UWS and is taking the technology to market at home and abroad.

“The results we achieved led into our current R&D programme....which is crucial to Aqualife's future strategy.” Phil Brown, Technical Director, Aqualife.

▲ Gas Sensing Solutions Ltd. in Cumbernauld make carbon dioxide sensors for use in industry, building control, horticulture and subsea work. UWS world-leading Institute of Thin Films, Sensors & Imaging helped them to create a portable fast-response carbon dioxide sensor for use in exercise science and sports applications. The new product helps determine the correct intensity of exercise for individual athletes.

“The new product which UWS helped us build will fuel our growth plans by allowing us to win market share.” Alan Henderson, MD, Gas Sensing Solutions.

▲ A strategic partnership between UWS and Loretto Care, an organisation which provides support to people in need across the west of Scotland, has helped build and sustain a world-class facility for people with Alcohol Related Brain Damage (ARBD). Loretto has been able to transfer much of UWS's world-class academic research and knowledge to its own staff.

“Loretto Care has enjoyed a positive relationship with UWS and takes great pleasure in this partnership.” Cathy Fallon, Director of Housing and Care, Loretto Care.

▲ Around 1.2million flights per year depend on National Air Traffic Services' Prestwick Control Centre for safe and efficient passage. In 2016 NATS formed a partnership with UWS to work on a range of projects covering joint research and knowledge transfer, collaborative education and training programmes.

“We were impressed by the UWS team's approach. We look forward to working with UWS students and academic teams on a range of initiatives and opportunities.” Alastair Muir, Director for Prestwick, NATS.



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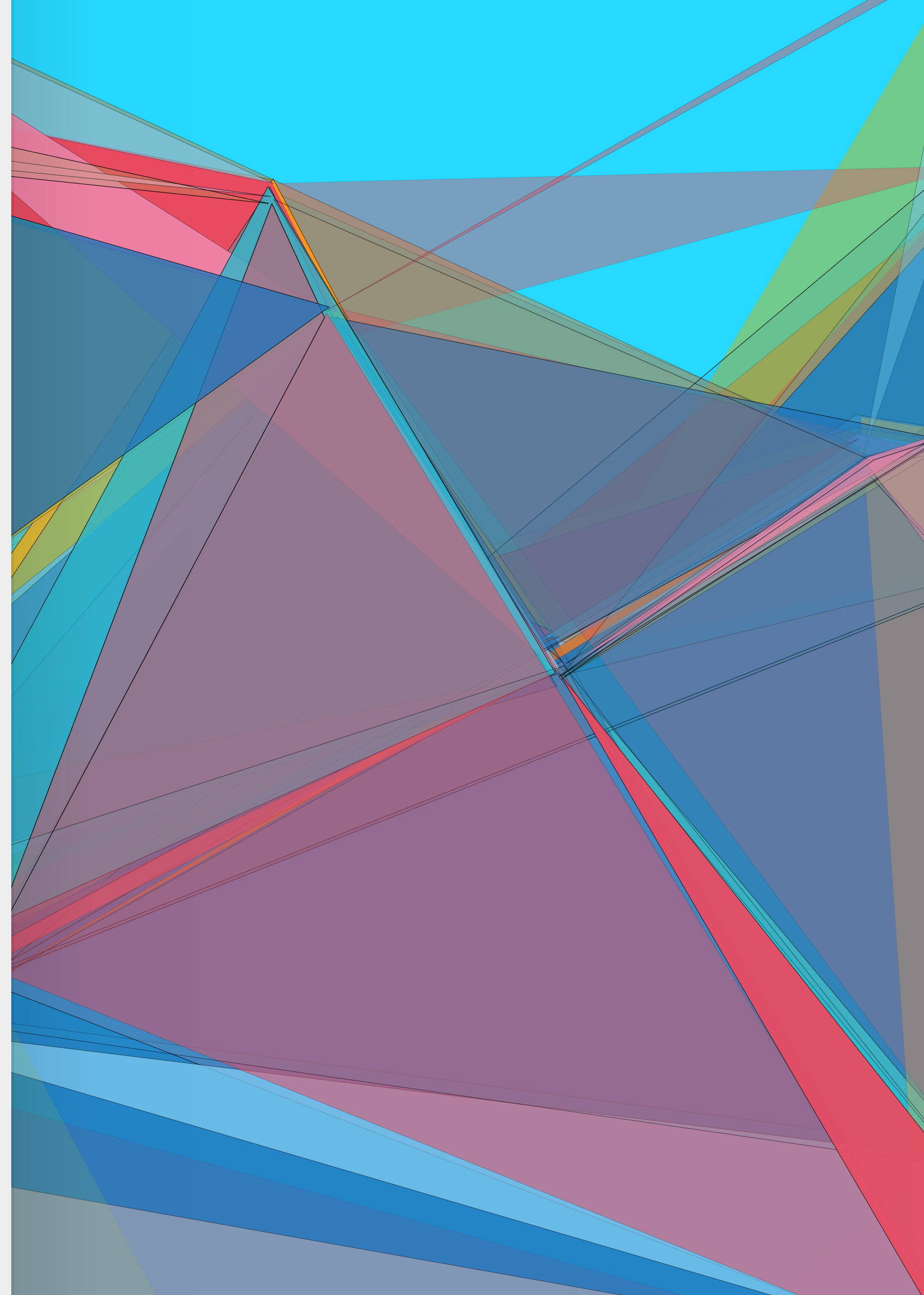
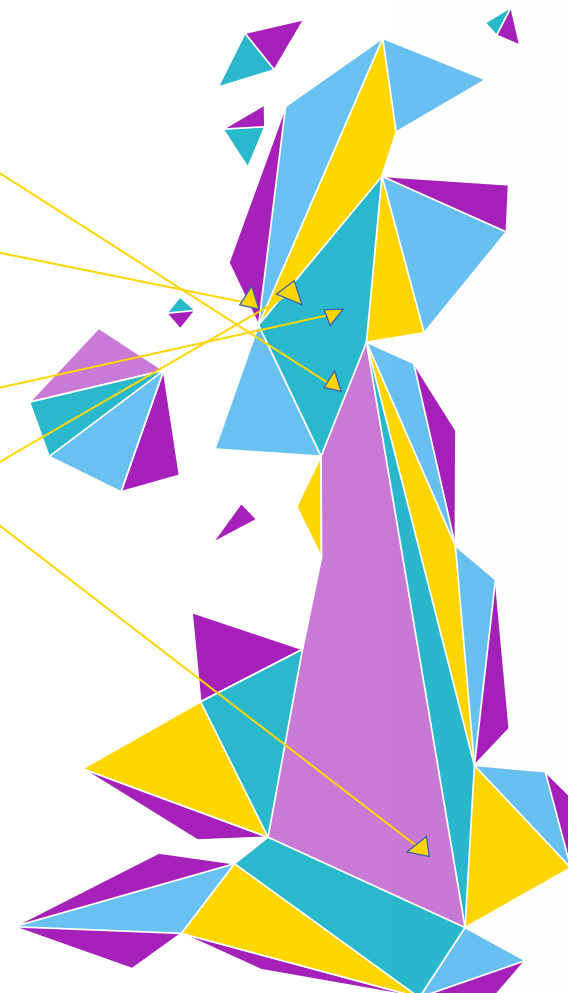
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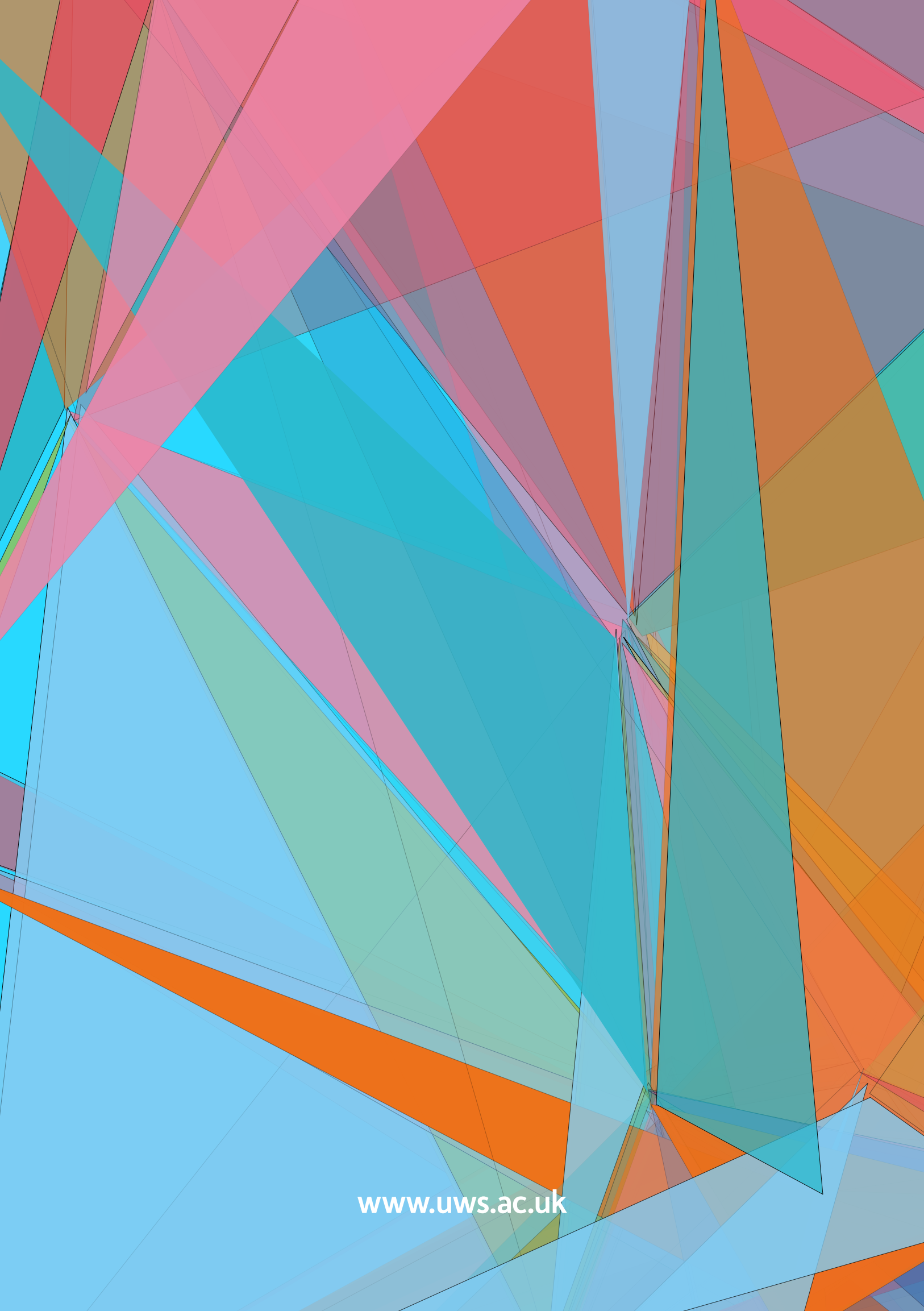
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