THE PLACE OF USEFUL LEARNING

University of Strathclyde Faculty of Engineering

University of Strathclyde Engineering

Sheena Mackenzie, Industry Engagement

Prof Campbell Booth, Vice Dean Research

Carolyn Arbuckle, West of Scotland KTP Centre

THE UNIVERSITY OF STRATHCLYDE

LEADING INTERNATIONAL TECHNOLOGICAL UNIVERSITY BASED IN THE HEART OF GLASGOW

Inspired by the University's founding principle as '**a place of useful learning**', our mission is to make a positive difference to the lives of our students, society and the world.

Strathclyde students benefit from an innovative and practical educational experience enhanced by its integration with the University's research capabilities, high-quality academic resources, and our industry engagement programme.

Strategic Themes

Advanced manufacturing & materials

Energy

Health & wellbeing

Innovation & entrepreneurship

Measurement science & enabling technologies

Ocean, air & space

Society & policy

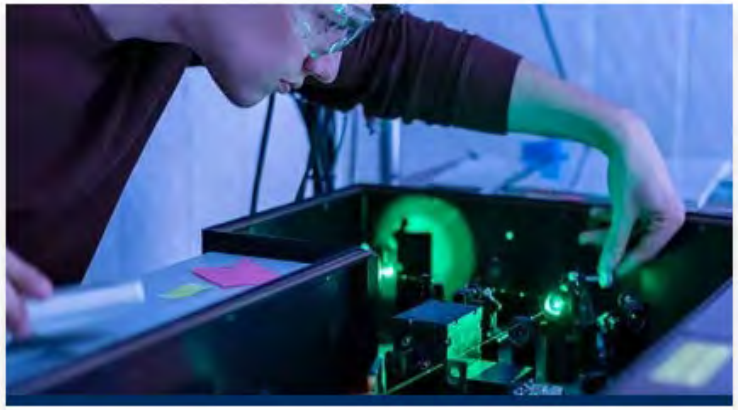
Technology Innovation Centre Clusters

5G & Advanced Communications

FinTech

HealthTech

Industrial Informatics



Quantum

Space

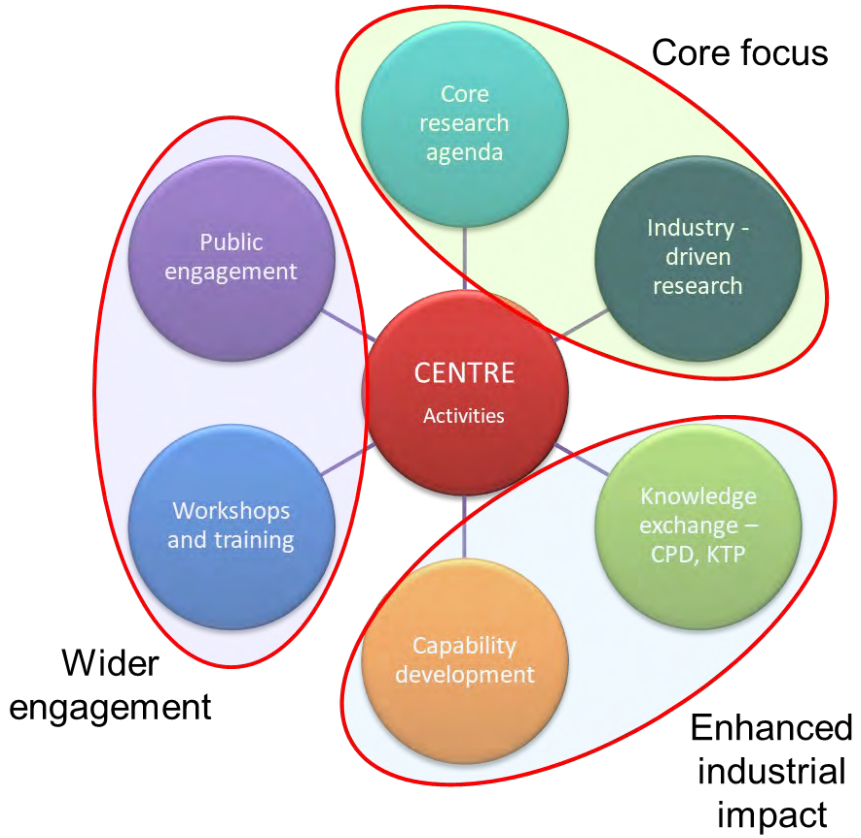
R&D across the Technology Readiness Level (TRL) spectrum

Technology readiness level (TRL)	1	2	3	4	5	6	7	8	9
Activity	Discovery & Research		Innovation					Commercialisation	
TRL description	Basic principles observed and reported	Concept or application formulated	Experimental proof of concept	Concept or process validated in laboratory	System or component validated in relevant environment	System model or demonstrator in relevant environment	System prototyping demonstrator in an operational environment	Actual system completed and qualified test & demo operation-al environment	Actual system mission-proven in successful mission operations

Source: The NASA-developed Technology Readiness Level model[17]

From fundamental through applied research to industry deployment the Faculty is engaged at all levels within the Technology Readiness spectrum – creating real business impact.

Industry-Facing Centres



NMIS
National Manufacturing Institute Scotland

10 UNIVERSITY of STRATHCLYDE PNDC A DECADE OF INNOVATION

NMIS
National Manufacturing Institute Scotland

Operated by the University of Strathclyde and supported by:

- Scottish Government,
- Scottish Enterprise,
- Highlands and Islands Enterprise,
- High-Value Manufacturing Catapult,
- Skills Development Scotland,
- Scottish Funding Council and
- Renfrewshire Council.

Objectives:

- Increase productivity - reducing barriers to innovation
- Stimulate investment - increase manufacturing competitiveness
- Drive job creation - strengthen supply chain links
- Inspire and attract talent - equip current and future workforces

- Advanced Forming Research Centre
- Lightweight Manufacturing Centre
- Manufacturing Skills Academy
- Digital Factory
- Collaboration Hub

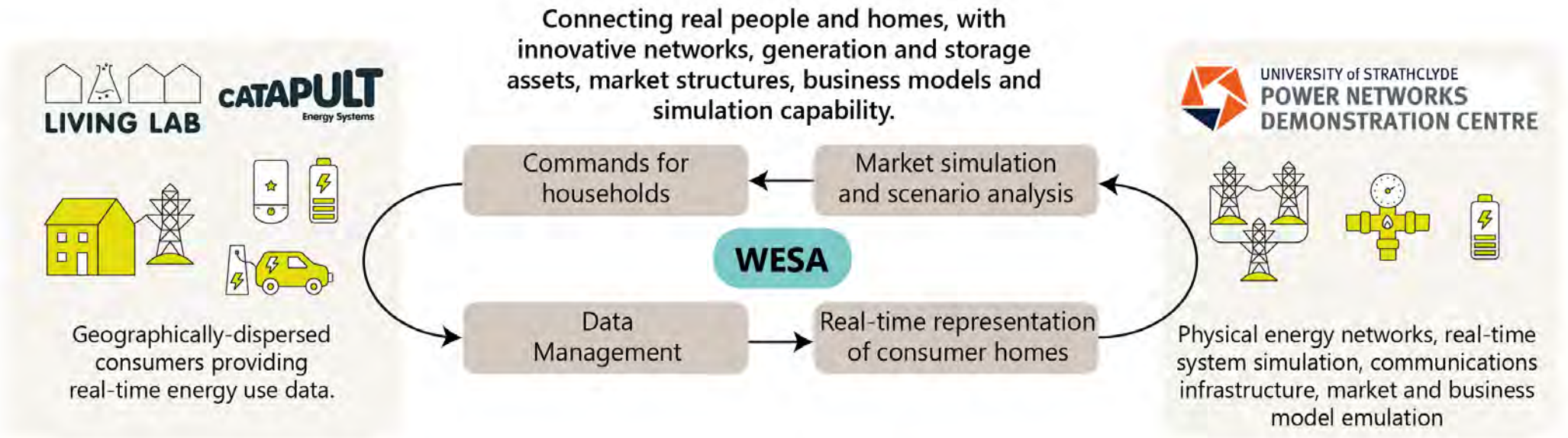
UNIVERSITY of STRATHCLYDE
PNDC
A DECADE OF INNOVATION

- Dedicated innovation facility, opened in 2014
- Whole energy system innovation, test and demonstration environment – maintaining strong focus on electrical networks and smart grid solutions
- Significant capability enhancements:
  - Heat
  - Transport
  - Hydrogen
  - Systems integration



- Permanent team of experts (> 30 staff)
- Operated in partnership with members
- Multiple collaboration models
- Open access for engagement with Industry for projects

Whole Energy Systems Accelerator



A unique national collaboration facility, providing space for industry, government and academia to test and demonstrate new technologies, products, services, business models, policies and regulation under simulated in-market arrangements with real consumers and real network infrastructure

Ways to engage

Industry-facing research centres

Membership

Collaborative projects and programmes

Consultancy

Collaborative Research and Development programmes

Knowledge Transfer Partnerships, Innovate UK & other funding sources

Industry-funded projects

Research, consultancy and services

Student placements, internships and projects

Skills and training

Continual Professional Development

Post Graduate Research

Graduate and Degree Apprenticeships and the Engineering Academy

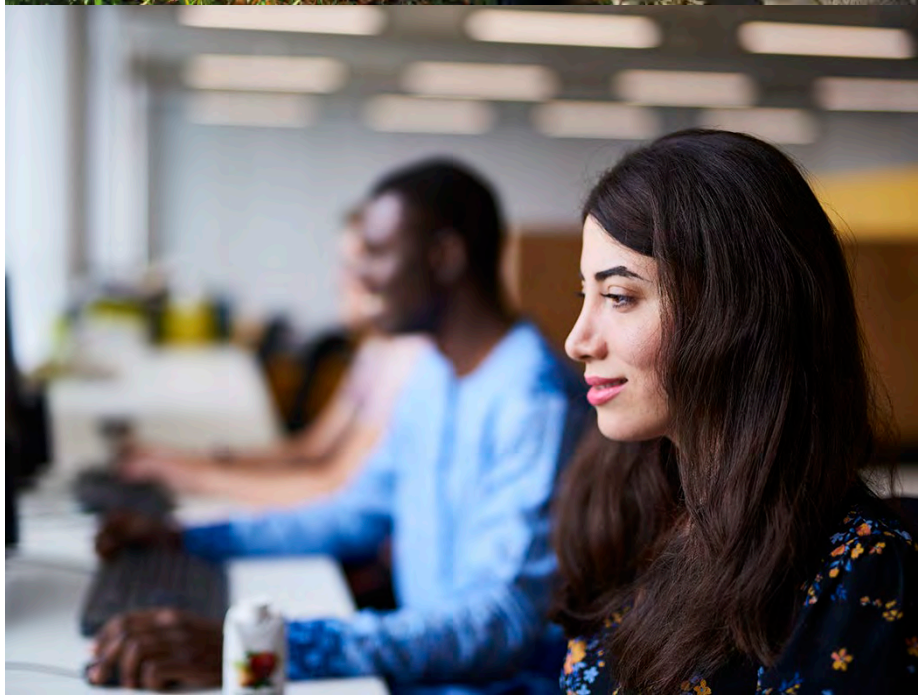
Industry-focused Masters – distance-learning and/or part time

Executive Education

Students

- ## Undergraduate Students
- Over 4000 undergraduate students
- Over 40 undergraduate degree courses
- All established courses professionally accredited
- Five of the top eight UK engineering UG courses (ranked by UCAS tariff points)

- ## Postgraduate Students
- Over 1400 postgraduate students
- 800 taught postgraduate students
- Over 40 taught (MSc) degrees
- Almost 700 postgraduate research students
- PhD, EngD, MPhil, MRes



Students and Graduates

Career Service Employers Hub

You can advertise:

- Graduate jobs
- Internships
- Placements
- Insight Days
- Gap Year Opportunities
- Volunteering Opportunities
- Vacation Work
- Part-time and casual jobs

What is the PhD@Work programme?

Engineers and scientists carrying out high-quality research in the normal course of their work

Joint industry/academic supervision

Impact to academia and industry

University of Strathclyde Engineering

iie-enquiries@strath.ac.uk

www.strath.ac.uk/engineering

www.strath.ac.uk/engineering/studywithus/industrialdoctorateprogramme/

www.ktpws.org.uk

www.ktp-uk.org/

X THE PLACE OF USEFUL LEARNING

University of Strathclyde Engineering

THE FACULTY OF ENGINEERING

www.strath.ac.uk/engineering

Scottish Engineering Breakfast Briefing February 2023

Who am I?

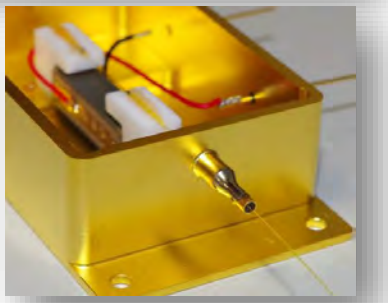
1987 – present: University of Strathclyde

BEng, PhD, RA/RF (Rolls-Royce UTC),Lecturer (2007), HoD EEE (2017), Vice Dean – Research (2021)

Research in power system protection – major projects with National Grid, ScottishPower, EPSRC (CDTs, PI on active UK/China grant, Prosperity Partnership), still teach a bit (CDTs, Hong Kong Dual Masters, CPD…)

2014 – present: Synaptec (Strathclyde spinout)

Distributed optical sensing (voltage, current, temperature, vibration) - 30 employees, wide range of investors, including Foresight Williams
https://www.foresightwilliams.co.uk/portfolio/



synaptec

www.synapt.ec

Who are we?

University of Strathclyde

4 Faculties

Engineering	Business	Science	Humanities and Social Sciences

Architecture

Biomedical Engineering

Chemical & Process Engineering

Civil & Environmental Engineering

Design, Manufacturing & Engineering Management

Electronic & Electrical Engineering

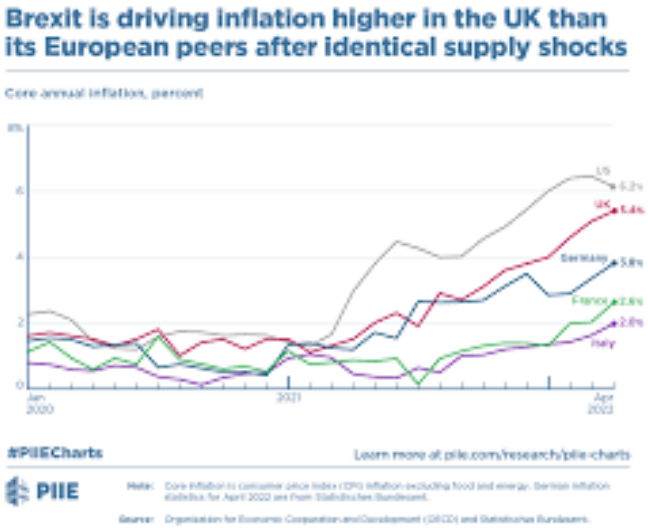
Mechanical & Aerospace Engineering

Naval Architecture, Ocean & Marine Engineering

AFRC
ADVANCED FORMING RESEARCH CENTRE
UNIVERSITY OF STRATHCLYDE

PNDC
UNIVERSITY of STRATHCLYDE

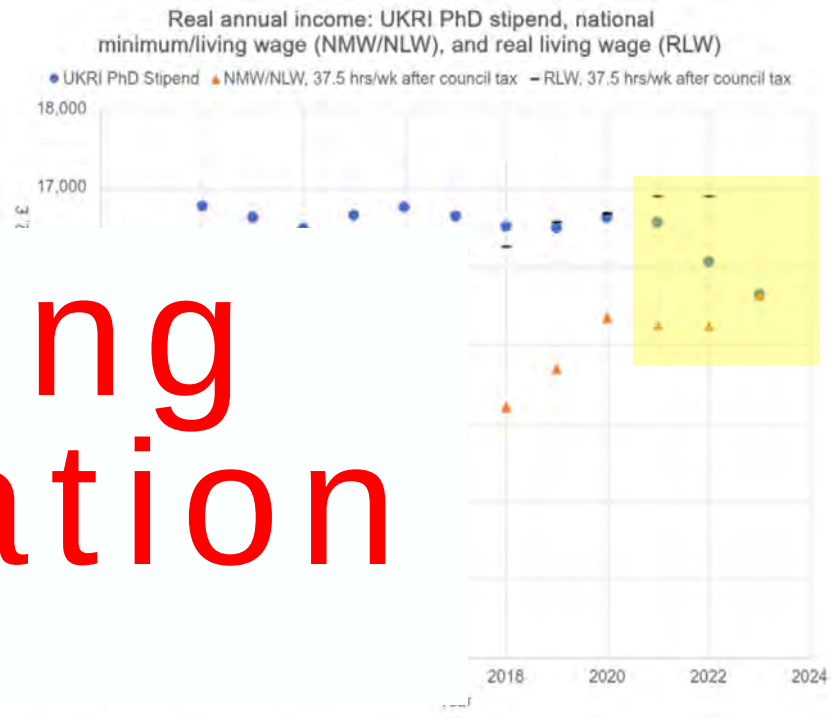

ABB
ACCA
AstraZeneca
AND Digital
ALBA
arbnco
babcock
BRODIES LLP
BLACKARROW FINANCIAL SOLUTIONS
business gateway
CENSIS
CMAC FUTURE MANUFACTURING RESEARCH HUB
4
cisco
CATAPULT Connected Places
CATAPULT Satellite Applications
CATAPULT Offshore Renewable Energy
CATAPULT High Value Manufacturing
CITY OF GLASGOW COLLEGE
CHRIS STEWART GROUP
Deloitte.
Digital Health & Care Innovation Centre
Entrepreneurial Scotland...
esa
EY
EGENCIA
EDRINGTON
ESB Energy for generations
energy technology partnership
FinTech Scotland
Fraunhofer UK
GE
gsk
Grant Thornton
Glasgowlife
bp
GLASGOW CHAMBER OF COMMERCE
Glasgow CITY COUNCIL
IBioIC
Investec
itison
LEYTON
invest Glasgow
NMIS National Manufacturing Institute Scotland
nationalgrid
NPL
ofgem
Pfizer
ROLLS ROYCE
Royal Bank of Scotland
SIEMENS
SCOTTISH EDGE
SCOTTISHPOWER
sse
Skills Development Scotland
stryker
SHOOSMITHS
Scottish Chambers of Commerce
Stantec
SOUTH BLOCK
THE DATA LAB value from data
The Scotland 5G Centre
technology SCOTLAND
Iarnród Éireann Irish Rail
WEIR
wsp
synaptec
CLP 中電



Our single biggest challenge?

(opinions are all mine)

A shrinking PhD population



A PhD – what's the point?

- They generate the vast majority of our outputs and impacts
- They know how to find answers
- They become more expert than their supervisors
- They don't/can't fear failure
- They can deal with negativity
- They can deal with uncertainty
- They create things and innovate
- They don't just research – they develop and receive training
- They compete and collaborate
- They have loads of transferable skills
- I sometimes cry when they (good ones) leave

https://cheekyscientist.com/job-candidates/

How does the PhD@Work programme work?

Candidates will spend a significant amount of their working time on the PhD research project, and will typically focus their research on industrial problems relevant to their company, ideally closely aligned to their present job. There is flexibility, and candidates undertaking a PhD@Work typically would do so on a part-time basis, allowing the research to progress in parallel and to be blended with the business needs of the employer.

Research projects are usually carried out at the candidate's workplace. Where appropriate, candidates may come to Strathclyde to use the research facilities, and to interact with supervisors and other colleagues. There may also be the option to undertake formal training in research-related skills and practices as part of **Strathclyde's Researcher Development Programme**. Prior experience and employer training and development programmes will also be considered when preparing an individual training portfolio to accompany the PhD research programme.

What is a PhD@Work?

A PhD is the highest postgraduate qualification offered by universities. PhDs are research-based degrees. In the PhD@Work programme, the candidate prepares an original research question/proposal in collaboration with their employer and an academic supervisor at Strathclyde, and explores that topic in depth.

The PhD@Work programme is for those who are looking to build on what they studied during their undergraduate and/or master's degrees, who are currently employed and wish to research a particular area of research within their field. Candidates will work with an academic supervisor at Strathclyde and an industry supervisor, ultimately making a contribution to knowledge and expanding the boundaries of a field of research.

What are the benefits to the candidate?

A PhD has traditionally been viewed as a training process for a career in academia. However, the modern PhD is a far more flexible qualification, focused on the development of transferrable research and leadership skills, career development and industry-specific training designed to help the candidate communicate and apply their research beyond a university setting. Candidates will also benefit from a "cohort experience", joining other PhD researchers from their own companies, other companies and full-time students - presenting valuable networking, peer learning and support opportunities. More than 70% of PhD graduates in the UK progress to non-academic careers, and research indicates that PhD graduates receive higher earnings, particularly in engineering.

What are the benefits to the company?

The company will be able to access the valuable knowledge gained during the programme, potentially exploit this for commercial gain, and also benefit from publicity and marketing opportunities associated with conducting world-leading research. This will create new opportunities for growth and innovation through the collaboration between Strathclyde and the partnering company. They will also have the opportunity to engage with world-leading researchers and innovators at Strathclyde who work within the research areas of interest to them, enabling knowledge transfer and networking within the Faculty of Engineering and further afield as they engage with Strathclyde's extensive networks.

Case studies

To gain an idea of what an industry-focused PhD looks like, take a look at a selection of recent case studies at **https://www.industrial-pgr.eng.strath.ac.uk/case-studies/** that showcase the breadth and depth of our postgraduate research projects, highlighting the impact these technology developments are making with our partners.

Why Strathclyde?

The Faculty of Engineering is a leading international centre for engineering research, based in Glasgow. We address global challenges facing society by undertaking collaborative research for the generation of new knowledge and understanding. The Faculty strives to deliver impact at scale and at pace, in keeping with the University's founding ethos as a "place of useful learning". This is achieved through Strathclyde's distinctive model of partnership working to deliver impact for business, industry, society and Government.

In the recent Research Excellence Framework (REF) 2021, our Engineering submission has the joint highest impact quality profile and the joint highest environment quality profile in Scotland, based on GPA as calculated by the THE. This is supported by almost 90% of research produced by the University of Strathclyde being rated 'world-leading' or 'internationally-excellent'.

Equality, Diversity & Inclusion (EDI)

The University of Strathclyde is committed to creating collaborative, inclusive and supportive working environments which enable high-quality, innovative and industry-focused research. All of our Engineering Departments hold Athena SWAN awards (1 Gold award, 7 Bronze awards) in recognition of our commitment to supporting gender equality in STEMM employment. In the Doctorate@Work programme, we will focus on ensuring diversity across the programme and will take a proactive approach to ensure equal access to the opportunity to underrepresented groups, those with varying backgrounds and working patterns, career stages, and those with protected characteristics.

Costs and timelines

The PhD@Work programme has flexible timeline options and attractive fee models (discounted from standard fees) to suit different individual and organisational needs. Candidates would typically join the programme on a part-time basis, spending 50% of their time over six years in completing the PhD. It may be possible to reduce this duration in some cases,and candidates can exercise an option to register initially for a two-year Master's by Research (MPhil) degree, with an option to transfer to a PhD degree being available subject to satisfactory initial progress being made. Prior learning that may contribute towards a PhD may also be considered in some cases. Please contact us to discuss your particular situation and requirements.

Find out more

To find out more about the programme and to contact us to discuss the options available visit **https://www.strath.ac.uk/engineering/studywithus/phdatwork/**

Escalating the Collaborative Programme

Expansion to include new *non-employee* PhD studentships

- ***GSK Programme Extension***

2012-2023, incl.
184 New PhD Students: 101 based at GSK; and
83 based at Strathclyde
with 3-6 month secondments in both directions

- To date:

Employee PGRs	*Industrial PhDs*	*Strathclyde PhDs*	*TOTAL*
56	77	59	**192**

https://www.strath.ac.uk/science/chemistry/strathclydegsk/

PhD@Work: some benefits

- Develops a mutually beneficial partnership – research is measured on impact
- Develops employees and secures them for the long-term – engenders loyalty/appreciation
- Company/employee make a leading and recognised contribution – academically and commercially
- Company can publicise – enhance reputation/image, recruitment, competitive advantage, recruit top students and put them directly on to PhD@Work?
- Consultancies can charge more for PhD consultants and differentiate
- University can support and invest – we need PhDs
- Wider benefits – networking, conferences, publications, academic-employer opportunities for other funding…
- “brain drain” and “skills gaps” – decarbonisation, net-zero, AI, robotics, manufacturing, health – who and where are the “experts”?

SCOTLAND

KALEIDOSCOPE
CHILEAN NAVY
ANAESTHESIA
TYPHOID VACCINE
CHICKEN TIKKA MASALA
INSULIN DISCOVERY
ARTIFICIAL DIAMONDS
BANK OF ENGLAND
CORDITE
SCOTCH PLOUGH
ELECTRIC TOASTER
FLUSHING LAVATORY
GENETIC CLONING
COLOUR PHOTOGRAPHY
PERCUSSION CAP
GHILLIE SUIT
PYROSCOPE
SAS
REFRIGERATOR
BAKELITE
TELEPRINTER
ROLLER PRINTING
GIN AND TONIC
BOVRIL
AULD LANG SYNE
US NAVY
STEAM ENGINE
PNEUMATIC TYRE

WAVE POWERED GENERATOR
GREGORIAN TELESCOPE
HOLLOW PIPE DRAINAGE
ADHESIVE POSTAGE STAMP
OIL REFINERY
PIN
HYPNOTISM
ICE HOCKEY
AUSTRALIAN RULES FOOTBALL
BETA BLOCKERS
BBC
LAWNMOWER
OVERHEAD VALVE ENGINE
INCANDESCENT LIGHT BULB
TARMAC
MARMALADE
CURLING
BREACH-LOADING RIFLE
HYPODERMIC SYRINGE
NAVAL LIGHT SIGNALLING
TUBULAR STEEL
PEDAL BICYCLE
GLASGOW COMA SCALE
PENICILLIN
KELVIN SCALE
POSTCARD
POSTMARK
BANK OF FRANCE

LONDON SCHOOL OF HYGIENE & MEDICINE
VACUUM FLASK
RADAR
ENCYCLOPAEDIA BRITANNICA
STEAM HAMMER
ELECTRIC CLOCK
STIRLING HEAT ENGINE
SULPHURIC ACID
BUICK
FAX MACHINE
FINGERPRINTING
RUGBY SEVENS
TELEPHONE
TELEVISION
CASH MACHINE
THERMODYNAMIC CYCLE
RADIATION THERAPY
GOLF
LIME CORDIAL
THRESHING MACHINE
KINETOSCOPE
HOT BLAST OVEN
COAL-GAS LIGHTING
MACINTOSH
FORBES MAGAZINE

University of Strathclyde Engineering

Dr Carolyn Arbuckle

Business Development Officer, West of Scotland
KTP Centre

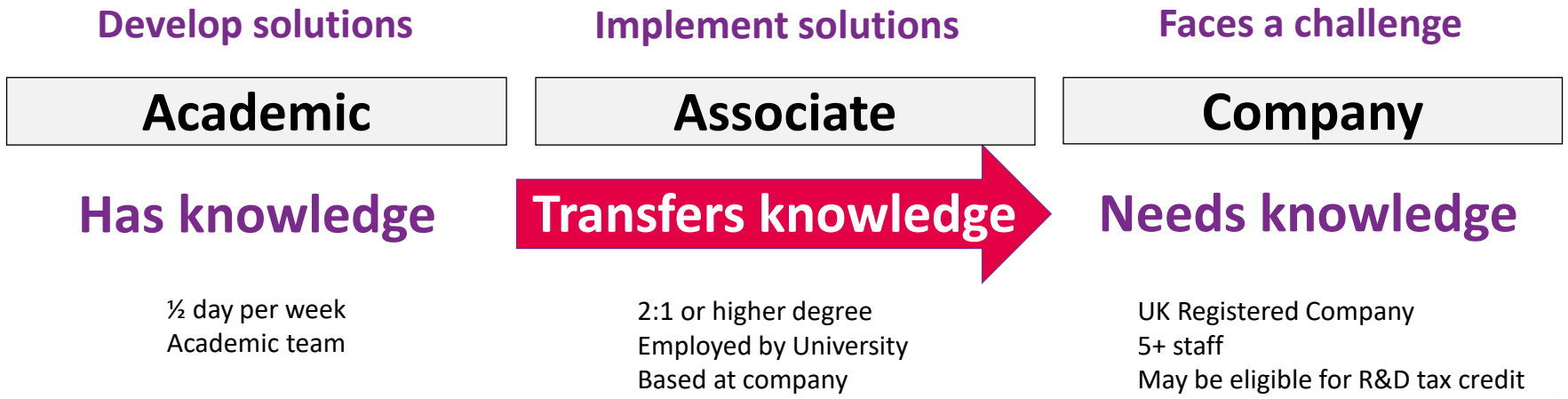
Knowledge Transfer Partnerships

Knowledge Transfer Partnerships (KTP)

One of the UK government's longest running and most successful knowledge transfer programmes, KTPs have been helping academics and UK organisations work in partnership for over 45 years

What is a KTP?

A KTP is a three-way partnership between a business, UK University or College, and a recently qualified graduate, known as the Associate.



KTP at Strathclyde

Biotangents

To develop a novel, prototype electrochemical sensing device for use in veterinary diagnostics for infectious diseases.

Renewable Parts Ltd

To develop a process for whole turbine decommissioning and re-circulation of turbine parts for the renewables sector

ALFRED H KNIGHT

To develop robust analytical methodology to support the creation of an index of risk of self-heating ability of biomass pellets

WB ALLOYS

To develop a product to monitor performance, compliance, condition and location of new and existing welding equipment.

KTP at Strathclyde

anderson bell + christie

Developing and implementing a data driven design process for Zero Carbon Neighbourhoods, creating a place-based community-oriented solution to deliver holistic zero carbon living within the social housing sector.

datum electronics

Building expertise in high fidelity engine modelling techniques and data analytics based on ship-board instantaneous shaft torque measurements, to create an integrated decision support system for marine engine condition assessment.

R&B DISTILLERS Handcrafted Whiskies of Uncommon Provenance

ISLE OF RAASAY DISTILLERY RATHARSAIR SCOTLAND

Embedding capability in biomass energy, clean fuel technologies and electrochemical energy storage to develop a holistic energy plan for decarbonisation that can be retrofitted to our current distillery site, and implemented at future planned sites.

Company benefits

Building long term Relationships

Grant funding
SME = 67%
Large = 50%

Skilled individual to deliver project

Access to University Resources (library/labs/equipment)

Associated Student Projects

Patents; Downstream IP

Academic input (min 0.5 days/week)

Jobs created

Journal Papers
Conference Papers

Increase Turnover

University research /skills applied to a commercial problem

Flexible projects

Budget and grant rates

- Project length 12 – 36 months
- Average project budget £105k p.a.
- Up to £55k p.a. employment budget
- £5,250 p.a. (T&S, consumables & training)
- Academic supervisor time and overheads
- SME → 67% grant funding (£32-37k p.a.)
- Large → 50% grant funding (£50-55k p.a.)

Application process and timescale

Find the right project

↓

Prepare the application with support from KTP Centre BDO and KT Adviser

↓

Submit application

↓

Funding outcome announced

↓

Proposal funded – Grant Offer Letter awarded

↓

Recruitment process for KTP Associate & start of project

6 deadlines a year

Hear outcome in **8** weeks

9 months to jointly recruit Associate

Is KTP right for you?

Does the business have a **challenging, strategic** project that will **create profit?** ✓

Is the project innovative – for the **academic** and the **company**? ✓

Would you like to embed **new** expertise, and drive competitive advantage by transferring the world class knowledge that resides within UK Universities? ✓

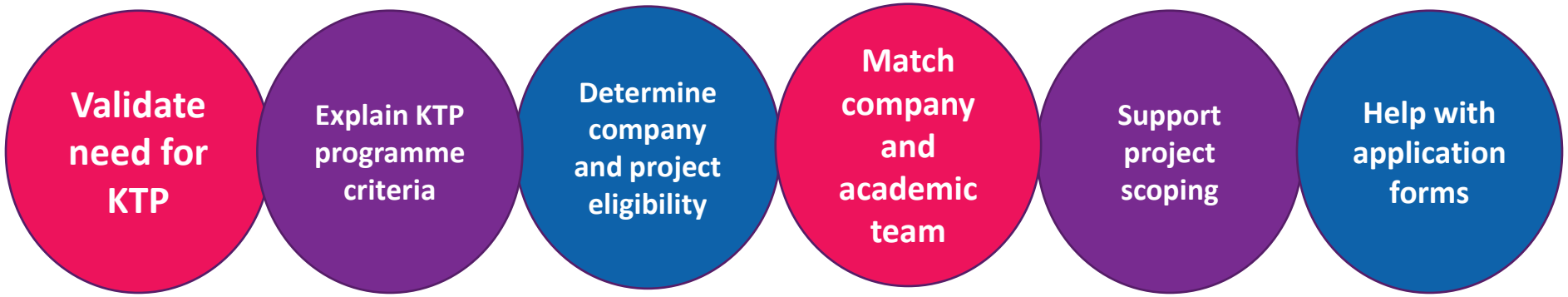
Is the business UK based with at least 5 full-time employees, and the capacity to contribute to the cost of running the KTP? ✓

If so, contact the West of Scotland KTP Centre.

West of Scotland KTP Centre

Since 1996:
- Helped establish over 500 projects
- Generated more than £65m KTP grant

The KTP Centre team will:



We will work also with the company and academic base to provide **recruitment**, **financial reporting** and **administrative support** one your project is funded.

Over 95% success rate in getting projects funded

Dr Carolyn Arbuckle
West of Scotland KTP Centre

50 George Street
Glasgow G1 1QE

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Email: carolyn.arbuckle@ktpws.org.uk
Twitter: @WestScotlandKTP