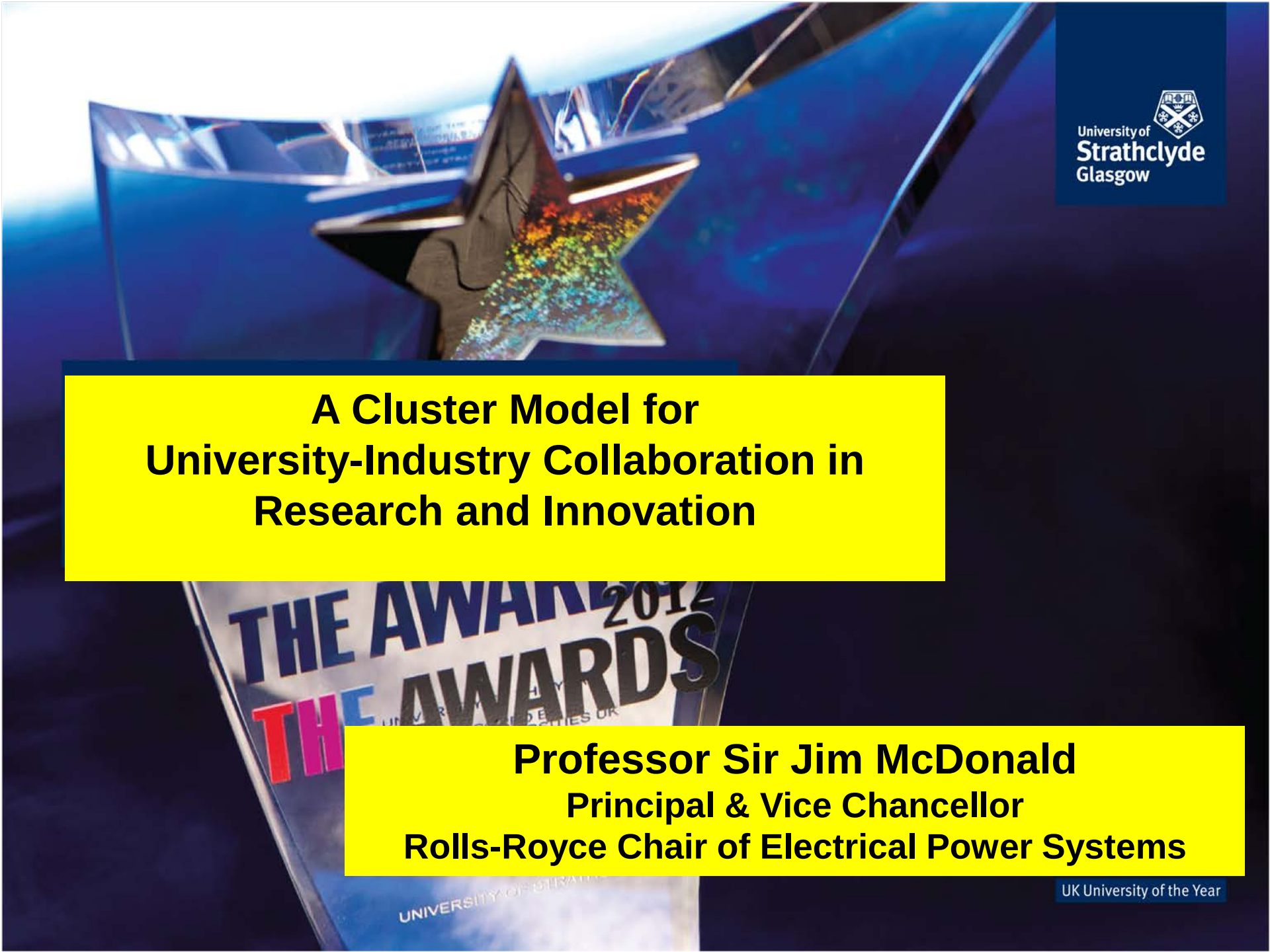


A Cluster Model for University-Industry Collaboration in Research and Innovation

Professor Sir Jim McDonald
Principal & Vice Chancellor
Rolls-Royce Chair of Electrical Power Systems

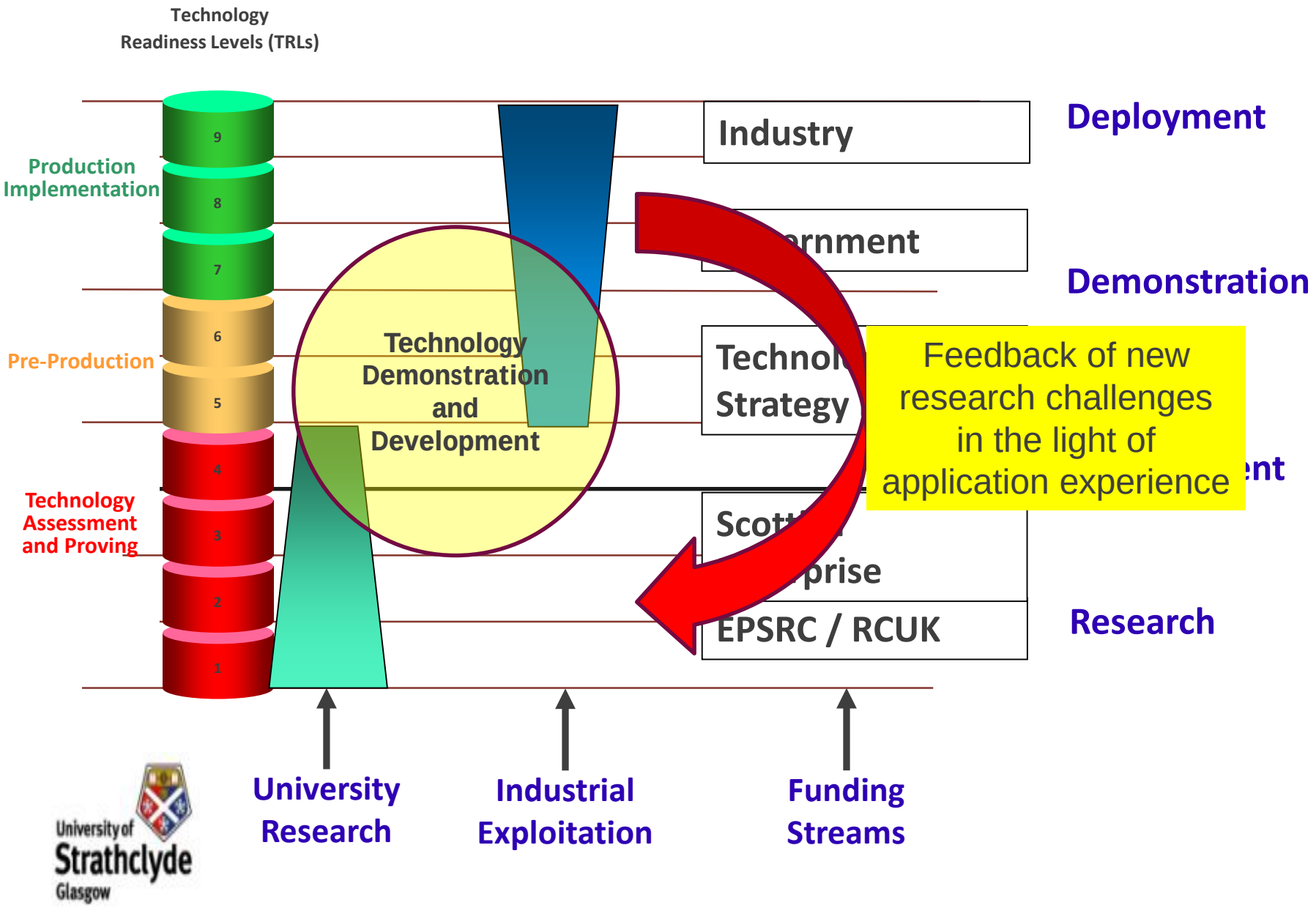
Summary……..

- This talk will present a model for university / industry research and innovation collaboration
- Reference will be made to a number of such Clusters established over the past 5-years at Strathclyde University in thematic areas including:
  aerospace manufacturing; pharmaceutical manufacturing; industrial biotechnology; photonics; public policy
- These Clusters are embedded in strategic research and innovation vehicles such as: UK Catapult Centres, Scottish Innovation Centres and Fraunhofer Centres
- By using a Technology Readiness Level (TRL) approach, the cluster model has been implemented in engineering, science, technology and social science themes
- The **'Triple Helix' principles** underpin this approach

University of Strathclyde Glasgow

THE AWARDS
UK University of the Year

New Innovation – Industry Collaborations



University of Strathclyde Glasgow

AFRC

ADVANCED FORMING RESEARCH CENTRE

UNIVERSITY OF STRATHCLYDE

University of Strathclyde Glasgow

Advanced Forming Research Centre

THE AWARDS 2012 UK University of the Year

CATAPULT High Value Manufacturing

Addressing Technology Readiness Levels 4-6

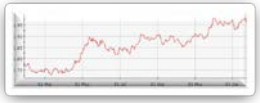
University of Strathclyde Glasgow

Product Challenges

- *New materials*
- *Novel geometry*
- *Tighter specifications*
- *Safety & environmental needs*

Business Challenges

- *Lower Operational & material costs*
- *Improved process capability*
- *Reducing lead times*
- *Delivery adherence*



Develop new capability to remain competitive

TRL 4-6

- Universities had limited experience
- Industry finds this time consuming and expensive
- Going it alone limits derived benefits

AFRC support

- Exploit research ideas
- Create commercial impact
- Strengthen supply chains

1 2 3 4 5 6 7 8 9

Technology Readiness Levels - TRL

Failure to Implement

Faster Time to Market

Product Differentiation

Capable processes

Enhanced Product Quality

Reduced Lifecycle Costs

AFRC ADVANCED FORMING RESEARCH CENTRE UNIVERSITY OF STRATHCLYDE

CATAPULT High Value Manufacturing

AFRC Members .....

University of Strathclyde Glasgow

Rolls-Royce

CPI Technologies Ltd

SPACECLAIM

RENISHAW

BOEING

esi

ekes

RTI Advanced Forming, Ltd.

FANUC Robotics

SCHULER

AUBERT&DUVAL

gom Optical Measuring Techniques

SURFACE GENERATION

HOUGHTON

TRANSVALOR

Barnes GROUP INC

LAND

NATIONAL INSTRUMENTS

ACB

Wilde

TIMET

QFORM2D/3D

MICAS SIMULATIONS LTD.

Zwick / Materialprüfung

Engineering Doctorate Centre

- ✓ EPSRC and Industry supported
- ✓ Hosted by AFRC and the Department of Design, Manufacture and Engineering Management
- ✓ Opportunities for industrial organisations to propose EngD projects and support an EngD student – costs are part funded by EPSRC
- ✓ **Currently 51 EngD & PhD students**
- ✓ **4 year programme** – including training element

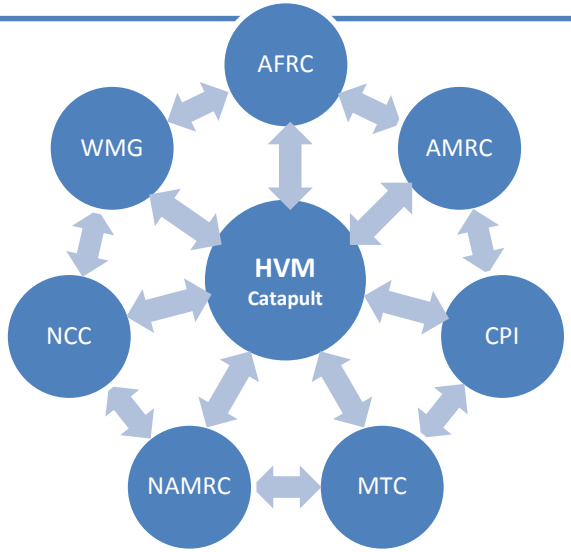
CATAPULT
High Value Manufacturing

University of Strathclyde Glasgow

Challenge

- Achieve a step change in activity and impact of manufacturing R&D in the UK
- Establish a network of regional facilities with complimentary capabilities

Major public investment programme



Many specialisms including

- Machining
- Joining
- Automation
- Powder processing
- Forming / forging
- Composites
- Automotive sector
- Chemical processing
- Nuclear sector
- Aerospace

Benefits

- Unprecedented scale of manufacturing R&D programmes launched in 2011
- Major companies are basing their manufacturing strategy around the Catapult

Offshore Renewable Energy Catapult

Driving innovation and knowledge

Professor Sir Jim McDonald
Deputy Chairman

Technology Strategy Board
Driving Innovation

CATAPULT

ORE Catapult …..
...a multi-faceted approach to drive innovation

Our vision:

Abundant, affordable energy from offshore wind, wave and tide

- Building a centre of deep technical expertise
- Identification, development and commercialisation of innovative technology
- Research, development, demonstration, testing and the establishment of new international standards
- **Driving collaboration between Government, industry and academia**
- Market access for SMEs and new technologies
- Leveraged funding model (1:1:1)

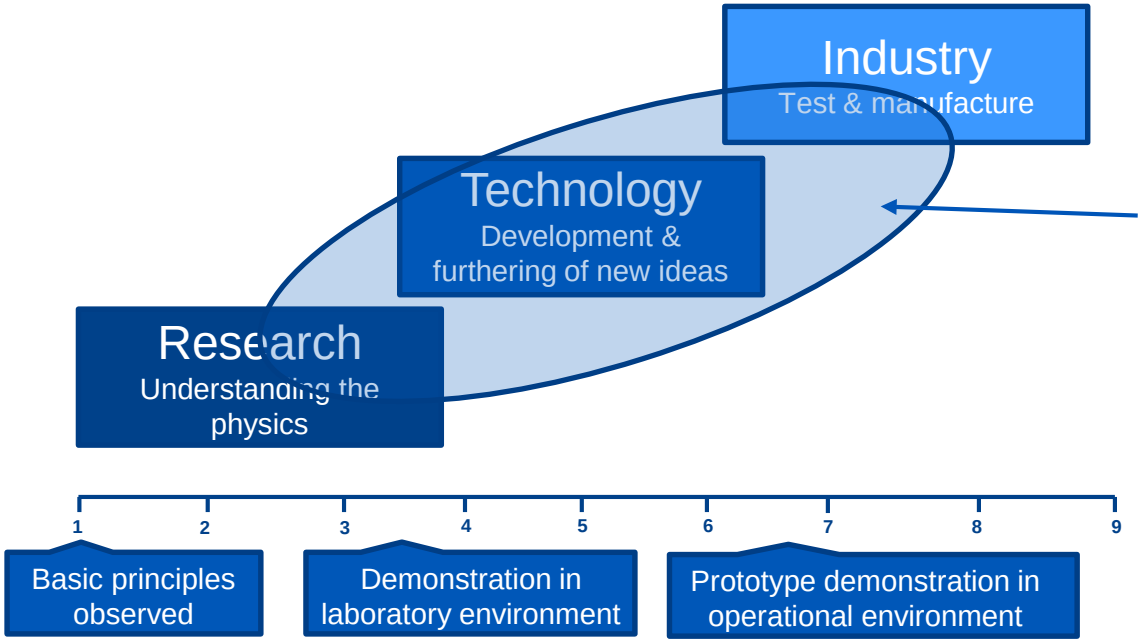
State of Art Blade and Drive Train test

Reduce Technology Risk, Cost, Time to Market

CATAPULT Offshore Renewable Energy

ORE Catapult translates best UK research into industry application

- ORE Catapult identifies the most promising research and works to fast-track development towards industry application
- A leading focal point within the UK's innovation landscape



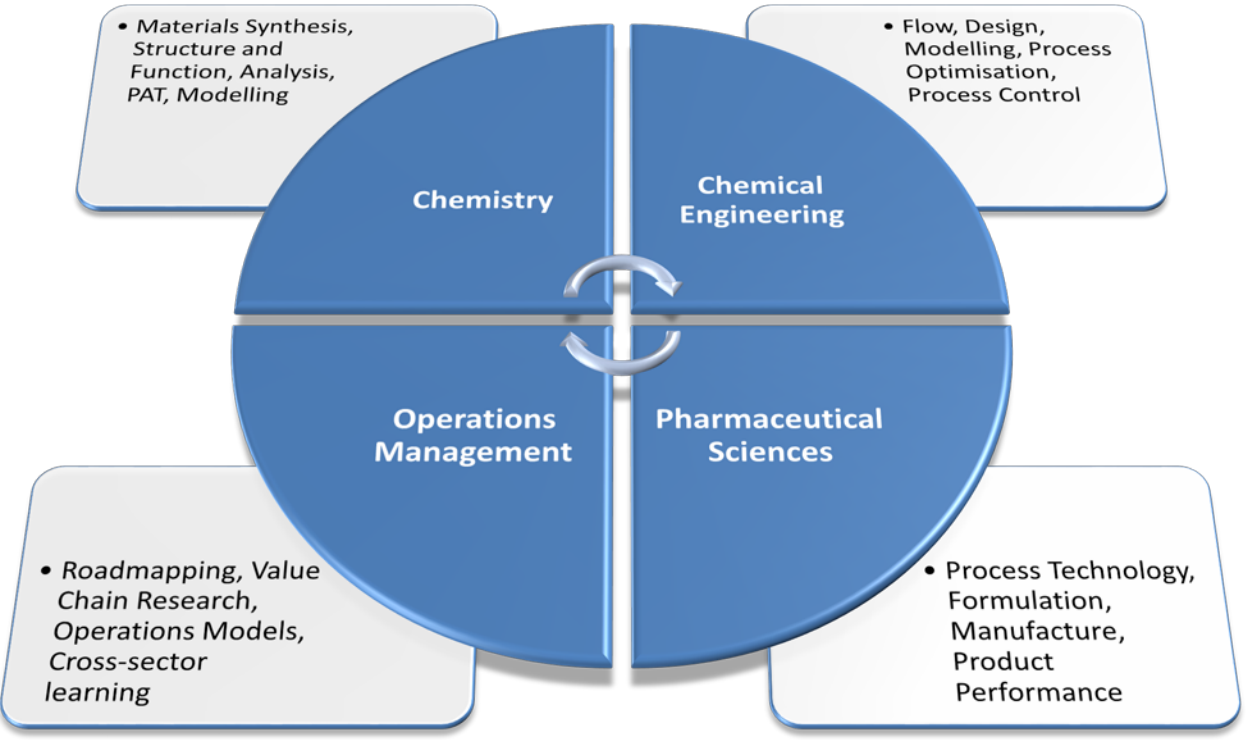
Catapult's expertise extends UK's innovation deeper into early stage technology & research

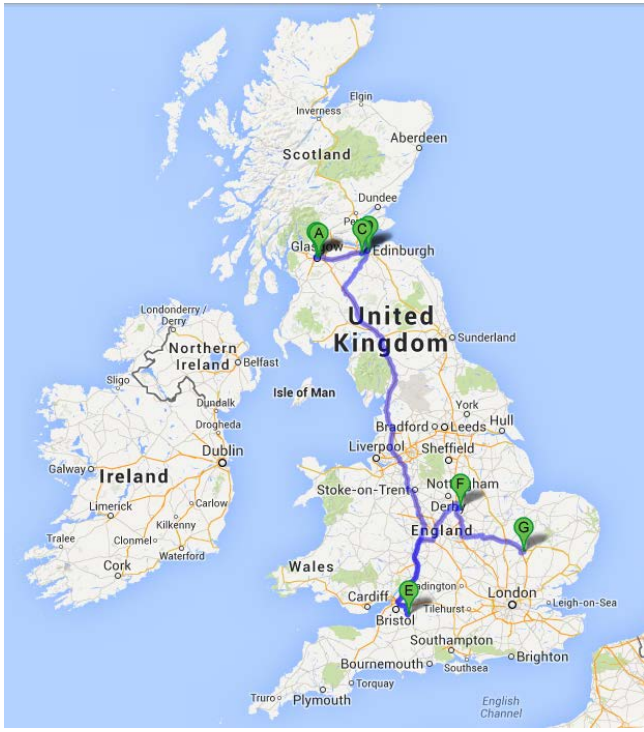
CATAPULT
Offshore Renewable Energy

EPSRC
Centre for Innovative Manufacturing
in Continuous Manufacturing and Crystallisation

CMAC

A Collaborative National Centre: multi-disciplinary academic team…and growing Research and PhD / MSc Programmes





Loughborough University · University of Bath · University of Strathclyde Glasgow · University of Glasgow · Heriot-Watt University · University of Cambridge IfM · GlaxoSmithKline · AstraZeneca · Novartis

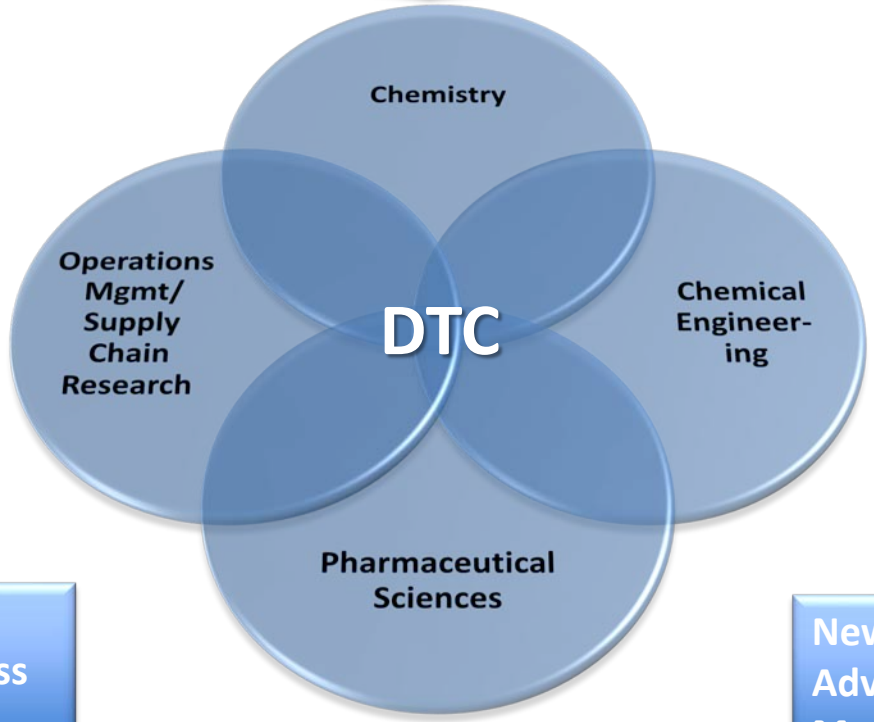
EPSRC
Centre for Innovative Manufacturing
in Continuous Manufacturing and Crystallisation

CMAC

Skills & Training - CMAC Doctoral Training Centre* & Masters Training Programmes

meet the needs for highly-skilled researchers to accelerate the adoption of continuous manufacturing for the production of high-value chemical particulate products.

Synthesis → Work-Up → Crystallisation → Isolation → Drying → Formulation



Provision of a world-class integrated programme across multiple disciplines

New MSc programme in Advanced Pharmaceutical Manufacturing

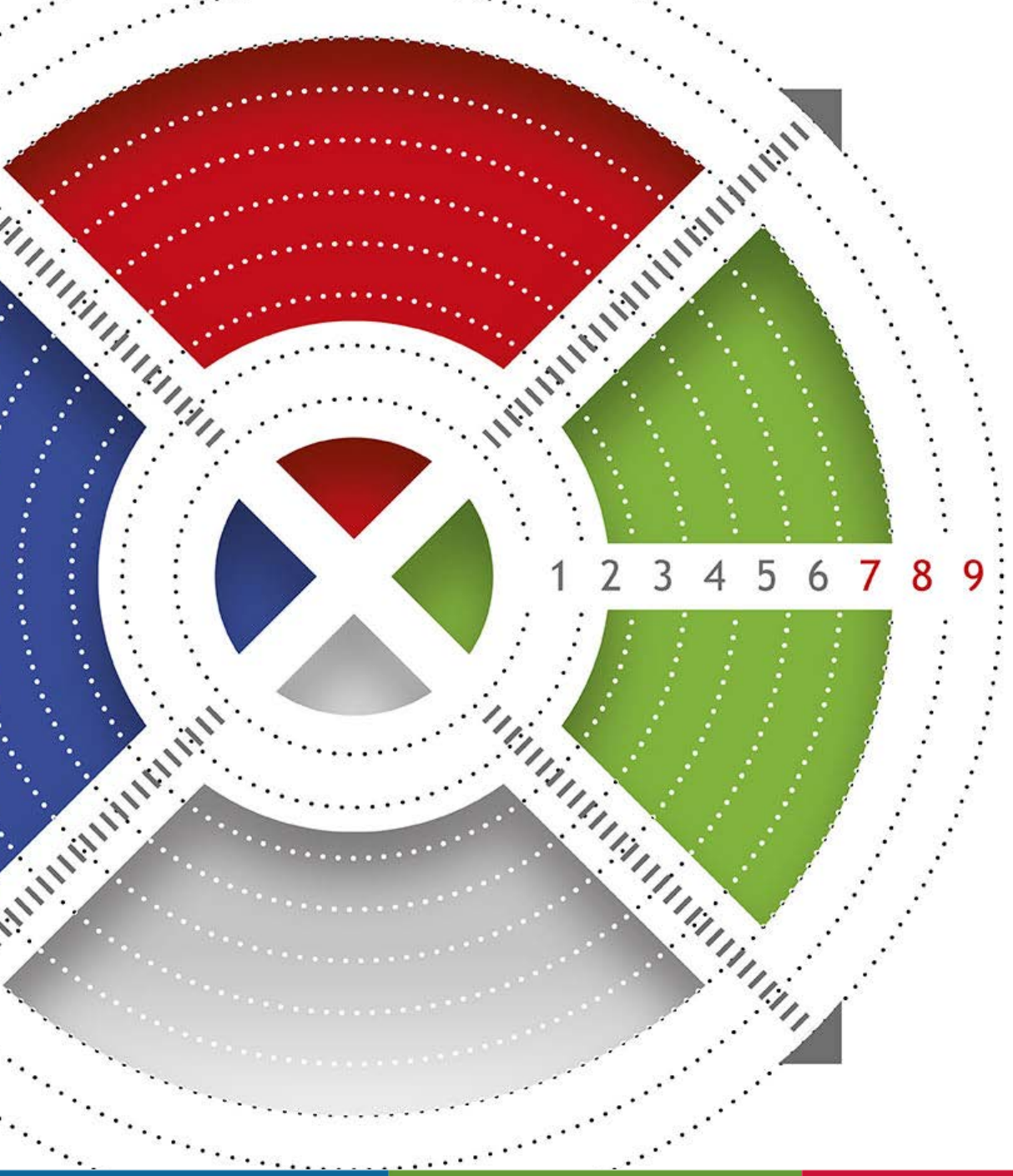
EPSRC
Centre for Innovative Manufacturing
in Continuous Manufacturing and Crystallisation

CMAC

Tier 1
£200k pa cash
Additional in-kind
Multinationals

Tier 2
In-kind
Technology companies
SME

Project Collaborators
Flexible interactions
Progress to Membership



IBioIC

Industrial Biotechnology Innovation Centre

Innovation Centres

Supported by The Scottish Funding Council, Highlands and Islands Enterprise and Scottish Enterprise.

Founding members

IBioIC

INEOS
THE WORD FOR CHEMICALS

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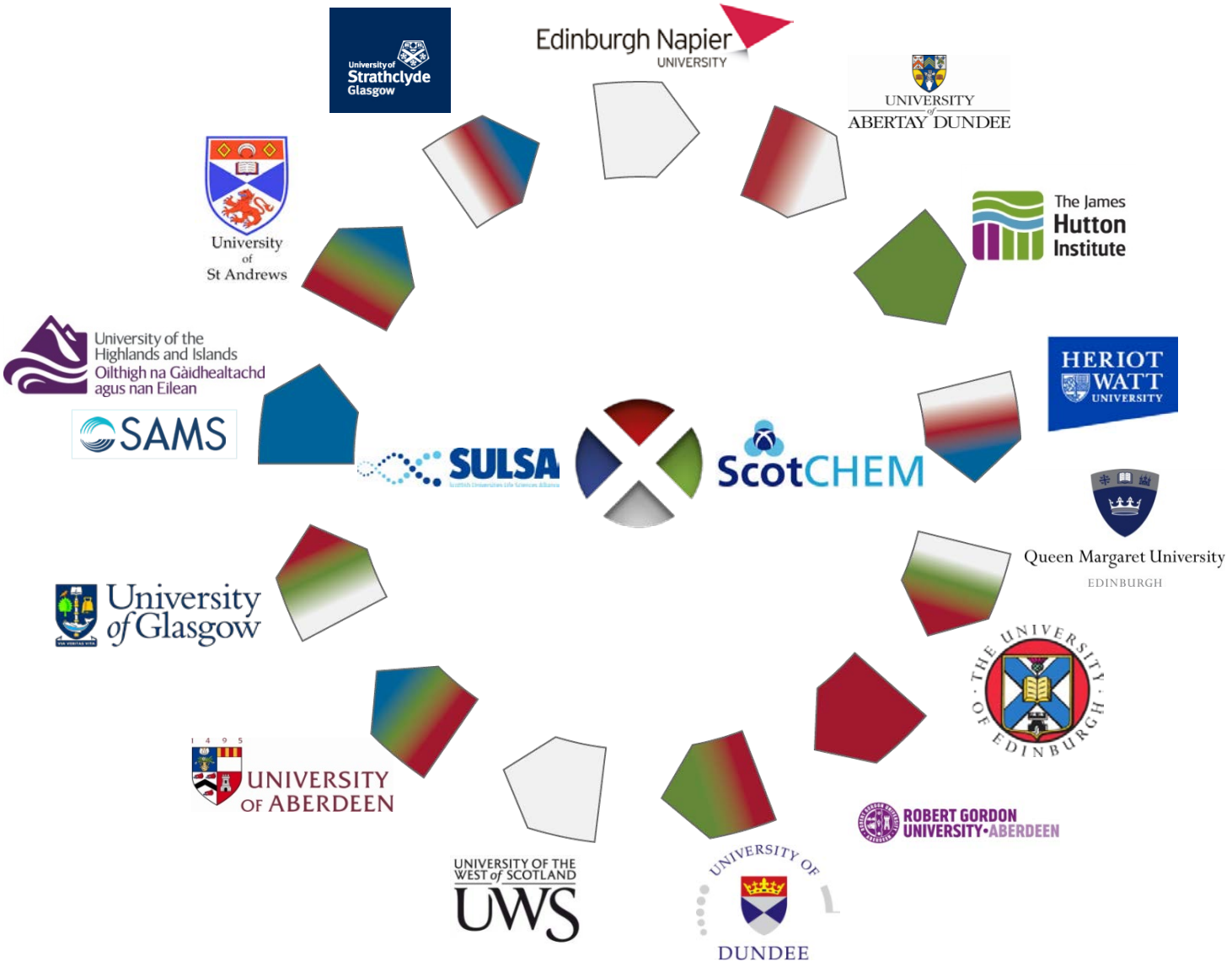
ingenza

Academic Partners

IBioIC



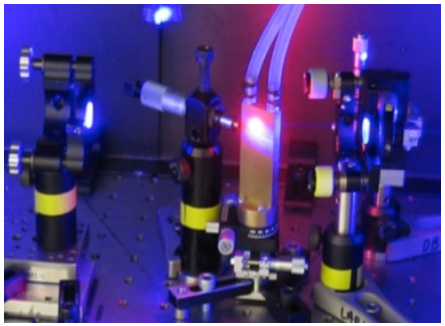
Key themes

IBioIC

- Sustainable feedstocks
- Biotransformations
- Cell Factory Construction
- Downstream Processing
- Integrated Bioprocessing

Fraunhofer in the UK

The Fraunhofer Centre for Applied Photonics at Strathclyde University

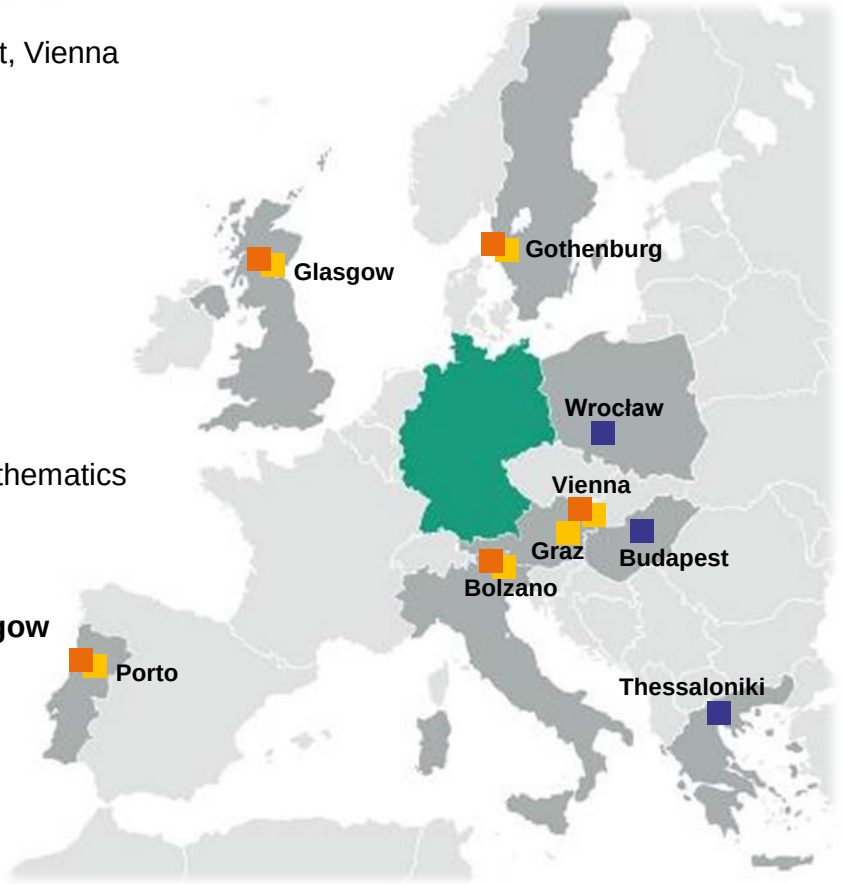


IN CONFIDENCE

Fraunhofer UK

Subsidiaries, Centres and Project Centres in Europe

- Fraunhofer Austria Research
  - Geschäftsbereich Produktions- und Logistikmanagement, Vienna
  - Geschäftsbereich Visual Computing, Graz
- Fraunhofer Italia Research
  - Fraunhofer Innovation Engineering Center IEC, Bolzano
- Fraunhofer Portugal Research
  - Fraunhofer Center for Assistive Information and Communication Solutions AICOS, Porto
- Fraunhofer Chalmers Centrum
  - Fraunhofer Chalmers Research Center for Industrial Mathematics FCC, Gothenburg
- **Fraunhofer UK Research**
  - **Fraunhofer Centre for Applied Photonics CAP, Glasgow**
- Fraunhofer Project Centre for …
  - Coatings in Manufacturing, Thessaloniki
  - Laser Integrated Manufacturing, Wrocław
  - Production Management and Informatics, Budapest

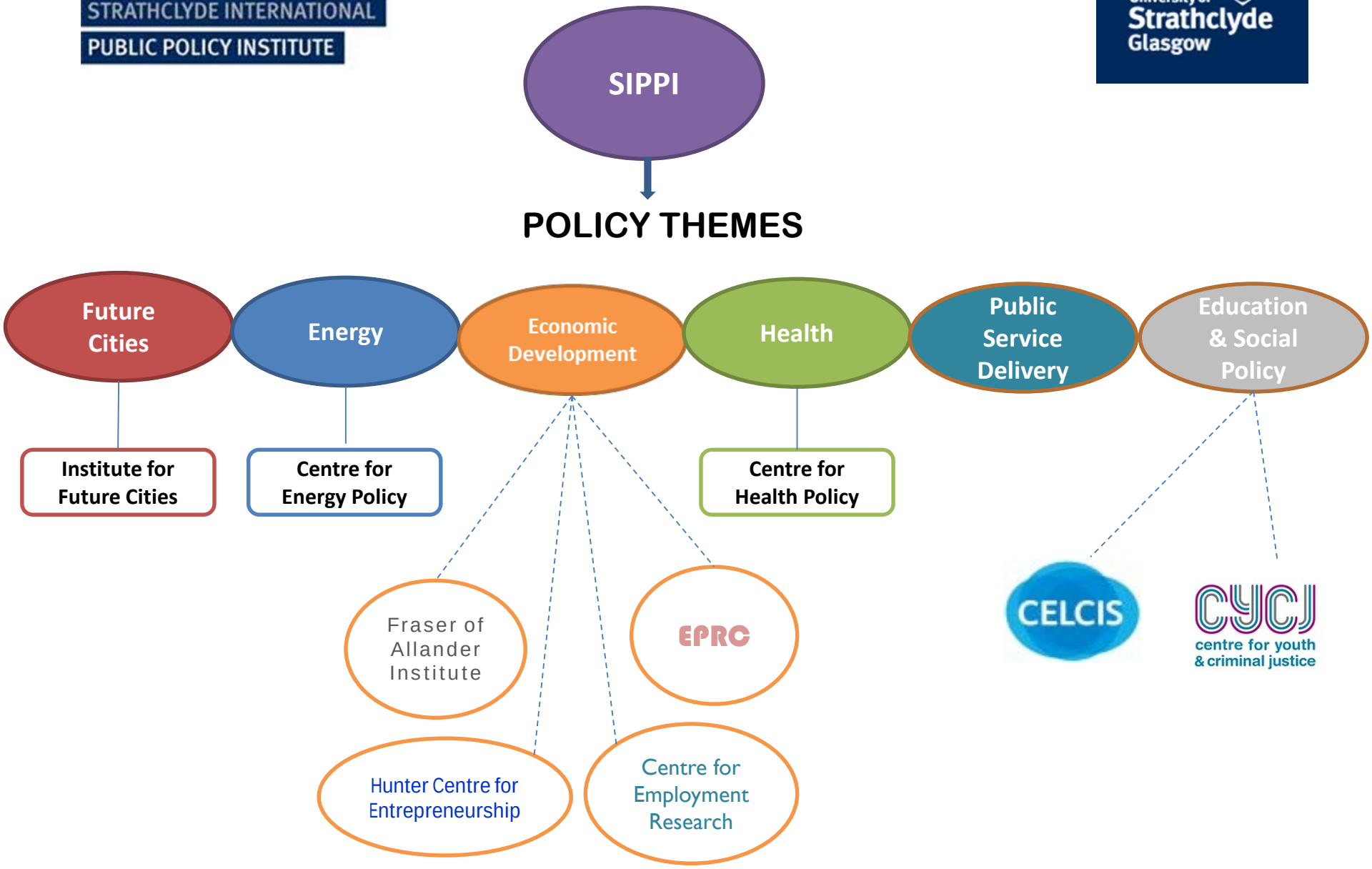


Fraunhofer UK

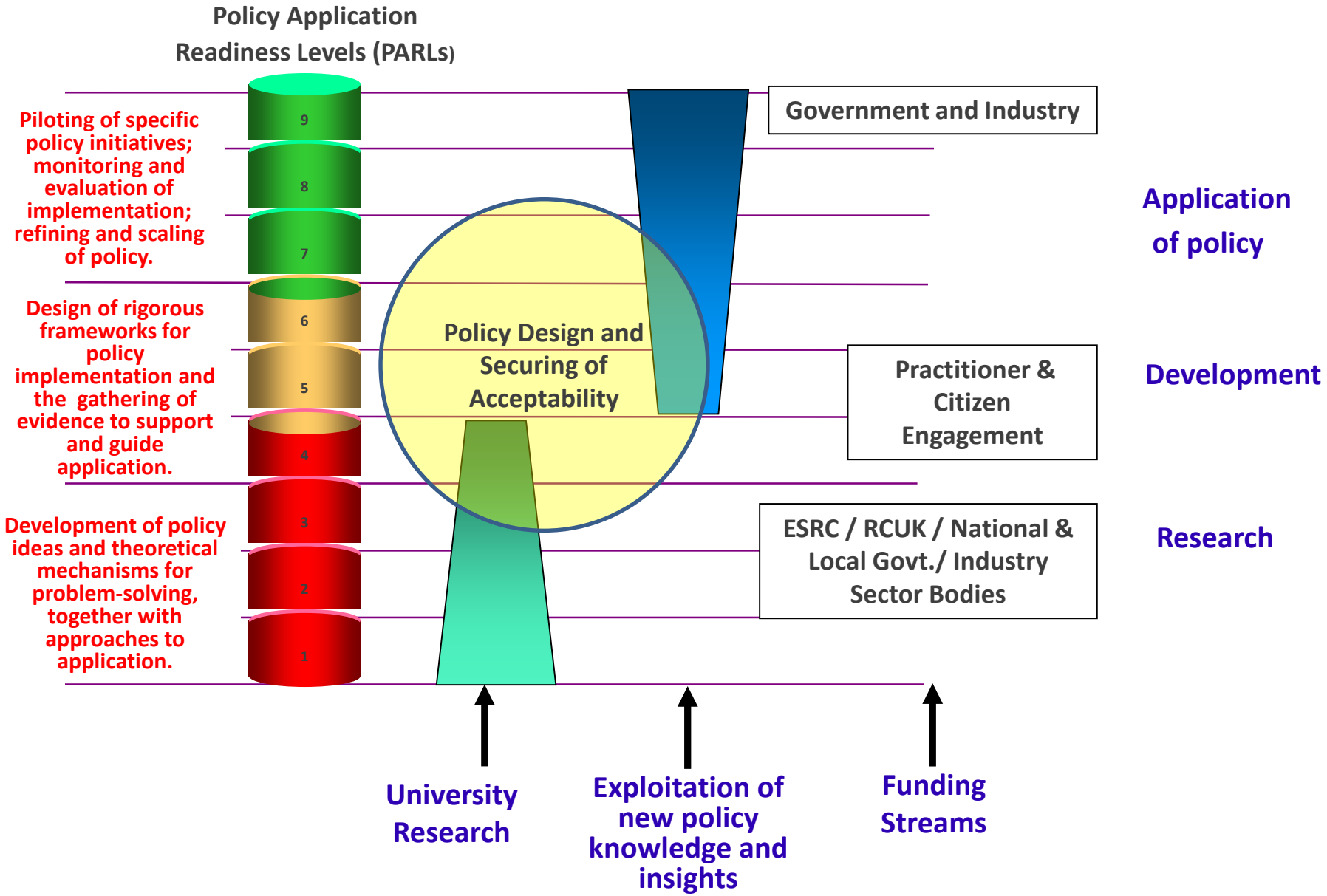
Can such a Cluster approach apply to Social Sciences?.....

STRATHCLYDE INTERNATIONAL PUBLIC POLICY INSTITUTE

University of Strathclyde Glasgow



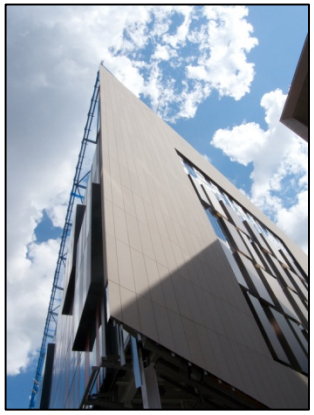
Innovative Solutions for Global Public Policy Challenges: Government and Industry Collaboration



UNIVERSITY of STRATHCLYDE
TECHNOLOGY &
INNOVATION CENTRE

New University centre for research, technology development and innovation

- **£103m** capital investment
- Accommodating 1,500 Industry, Research, KE staff and PGR students
- Comprises
  - *25,000m2* Technology centre
  - *4,600m2* Industry Partner centre
- Strong emphasis on creating Industry research and innovation clusters through **open innovation**, collaboration and impact
- Access to state-of-the-art, flexible research and innovation facilities
- Development of new pathways for Innovation and Technology development
- New approaches to partnership funding, leverage and engagement mechanisms



Conclusions……..

- To establish these Research and Innovation Clusters, priority should be given to the cycle of **concept – research – development – demonstration – deployment (and the feedback loops within)**

- Greater focus on synergy between National Research Councils, Economic Development Agencies and Innovation-led industries ….**Universities can / should catalyse these relationships**

- Essential that an **effective environment** is created – **Open Innovation** or other structured multi-partner arrangements.

- **Co-location and detailed sharing of strategic priorities** support the development of the conditions and behaviours. **Leadership & Ownership** within and across the partners are critically important.

- ** The production of high quality, entrepreneurial, research & innovation trained people can have the highest and longest lasting impact

University of Strathclyde

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