

# The University role in developing Innovation Eco-systems

*CRP 2018, 14-15 September 2018,  
University of Strathclyde  
Glasgow, Scotland*

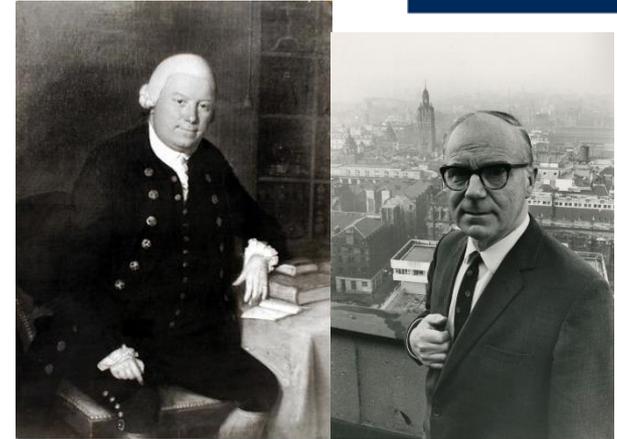
**Prof Sir Jim McDonald**

Principal and Vice Chancellor

University of Strathclyde

# About Strathclyde.....

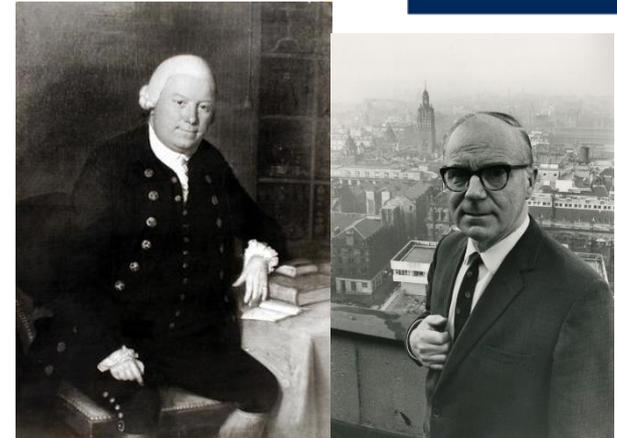
- Founded in 1796 as a “Place of Useful Learning” by John Anderson, collaborator of James Watt
- Royal Charter awarded 1964
- Scotland’s only “Enlightenment University”
- In the last UK Government Research Excellence Framework (REF) Audit, Strathclyde joined Top 20 UK Research Intensive Universities
  - Physics #1 in UK - REF2014
  - EEE, MechEng, Naval Arch, Design & Manuf #3
  - Chemistry, Pharmacy, Biomedical Sciences #4
  - Business School #1 for research environment
  - Government and Public Policy #10
- Leading International Technological University and Socially Progressive Institution
- Strong collaborative culture – addressing challenges of scale in partnership with international academia, industry and Government
- Proponent of the “Triple Helix” philosophy



# About Strathclyde.....



- 3,600 staff - 800 academics, 1,200 research staff 15,000 UG students, 7,500 PG students, ~350M Euro p.a.
- UK Times Higher Education (THE) Awards:
  - UK Research Project of the Year 2011
  - UK University of the Year 2012-13
  - Entrepreneurial University of the Year 2013 -14
  - UK Business School of the Year 2016-7
  - Workplace of the Year & Strategic Planning Awards 2017
- We host: 4 UK Catapult Centres, 3 Scottish Innovation Centres, Fraunhofer UK
- UK Govt appointed strategic partner for the National Physical Laboratory (NPL) (in partnership with Univ. of Surrey)
- EPSRC Framework Partner (Top 12 UK portfolio holders)



# International Profiling

## R&D, Innovation & Post-Grad Education Partnerships



CESAER

conference of european schools  
for advanced engineering education  
and research

Stanford  
University



Massachusetts  
Institute of  
Technology



香港科技大學  
HONG KONG  
UNIVERSITY OF  
SCIENCE &  
TECHNOLOGY



Tsinghua University



Global industry strategic partners, including:



SIEMENS



# Developing Innovation Ecosystems – the Impact Challenge

- Distinctiveness of Universities of Science and Technology
  - Translate excellent research to applications, solutions and tech disruptions
  - Educate the new generation of leaders in science, engineering & technology
  - Bridge TRL and MRL levels to generate technology /system benefits
  - Should be leaders in developing innovation and impact on society & economy
  - Collaborating with industry to drive sustainable economic growth
  - Supporting entrepreneurship & commercialisation (incl. spin-outs and start-up companies)
- Key questions at CRP2018
  - How can we provide leadership in an ecosystem context?
  - How can governments best support us and our partners?
  - How do we develop a new generation of impactful *and* excellent researchers?
  - How do get value by linking across innovation ecosystems?
  - How do we build on international experience of innovation ecosystems?

# Technology and Innovation Centre - TIC

- TIC concept is for strategic collaboration between business, industry, government and academia – and co-location
- 700 researchers working alongside Industry labs e.g.:
  - UK National Facility for Continuous Manufacturing of Pharmaceuticals (GSK, AZ, Novartis, Bayer...)
  - UK national centres for doctoral training in: smart grid; advanced manufacturing; medical devices
  - Fraunhofer Centre for Applied Photonics
  - Rolls-Royce Centre for Aero-electrical Systems
  - WARC and much more
- 4 UK Govt ‘Catapults’:
  - High Value Manufacturing; Offshore Renewable Energy; Satellite Applications; Future Cities
- 3 Scottish Govt Innovation Centres:
  - Industrial Biotechnology; Digital Health; Sensors and Imaging Systems



TIC - together with the Inovo and Tontine Accelerator - forms the heart of the recently announced **Glasgow Innovation District**..... the first ID in Scotland

# Glasgow Innovation District purpose – A ‘place’ for innovation in Scotland

- Position Glasgow as premier innovation location – for researchers & industrial innovators
- Access to clusters in: power & energy, photonics, pharma, industrial informatics, biomedical technology, enabling and quantum technologies, space and specialist facilities
- Establish Glasgow’s Merchant City as the ‘hub’ for innovation activity
- Student benefits: Internships, job opportunities, work-based learning. digital apprenticeships & project funding
- Make innovation ‘visible’ to citizens, companies, student / researcher talent and the wider community
- Access to a community of innovators and innovation services



# National Manufacturing Institute for Scotland

## - NMIS the Manufacturing Innovation District



- Strategic priority of Scottish Government with Strathclyde as the lead partner
- Created around our Advanced Manufacturing Research Centre (~150M programme)
- New investment of Composite / Light-weighting Centre announced in June by First Minister
- **Creating a £1Bn Innovation District**, Public Sector (£100M) and Industry, (£900M);
- 10,000 high value manufacturing jobs;
- Co-location of research, skills development, services and high value manufacturing industry;
- Three public sector investments:
  - Research & Skills Academy; Digital Factory of the Future; Collaboratorium
- Partners:
  - UK Government / HVM Catapult;
  - SG, SE, SFC, SDS, HIE, SRPE, Glasgow Airport;
  - Industry

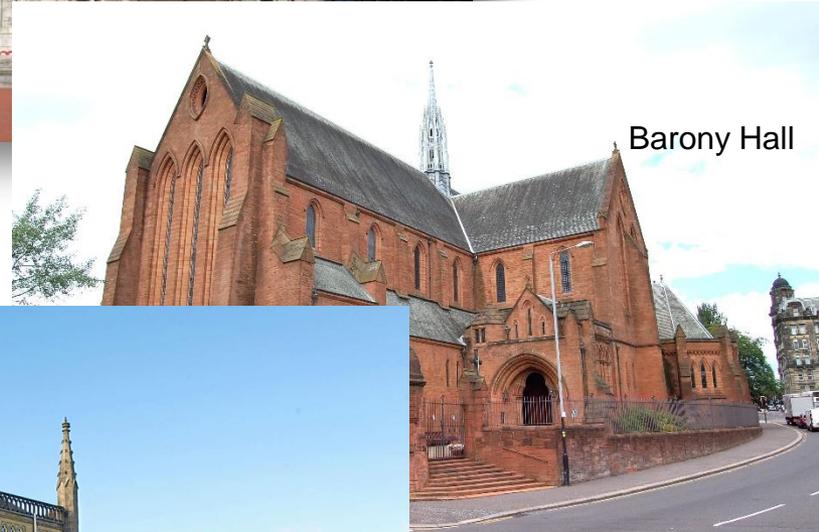
# Venues for conference and social programme



Technology and Innovation Centre



City Chambers



Barony Hall



Ross Priory

A photograph of a modern, multi-story building with a prominent glass facade and a large, angular entrance. The building is surrounded by a paved area with some greenery and a few people sitting on the steps leading up to the entrance. The sky is blue with some clouds. The text "Céud Míle Fáilte go Glaschú" is overlaid on the top part of the image.

*“Céud Míle Fáilte go Glaschú”*

**“A Hundred Thousand Welcomes to Glasgow”**

A LEADING INTERNATIONAL TECHNOLOGICAL UNIVERSITY

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STRATHCLYDE

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INNOVATION

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# Getting to Glasgow



2 International Airports,  
Glasgow International and  
Edinburgh



15 minutes from  
Glasgow Airport to  
city centre

*easy to get to*

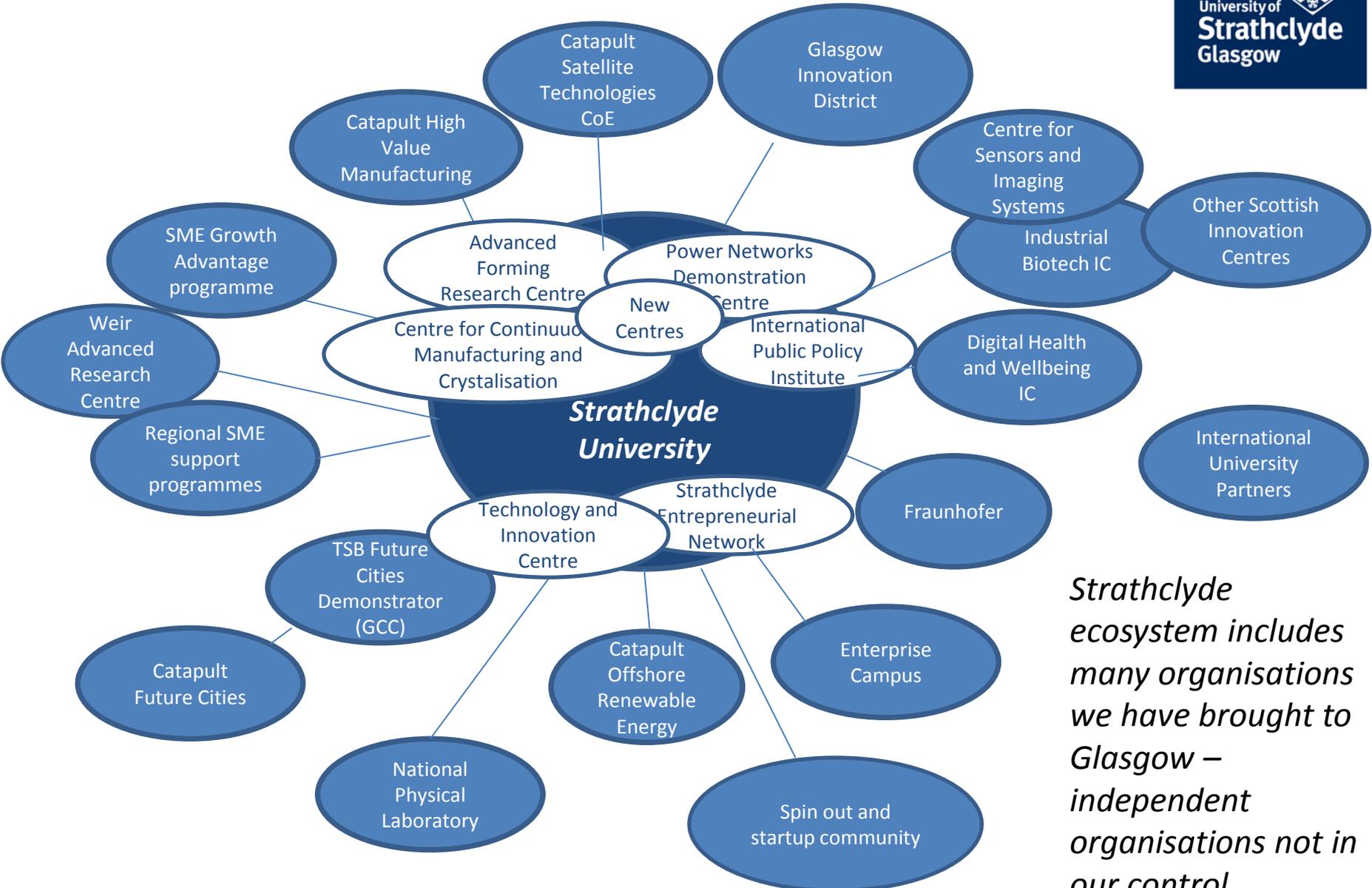


150+ direct  
international  
routes

*TIC - City Centre location by the "Merchant City"*

*Excellent range of hotels nearby*

# Strathclyde Innovation Eco-system



*Strathclyde ecosystem includes many organisations we have brought to Glasgow – independent organisations not in our control*

# EPSRC Doctoral Training Centres

Continuous  
Manufacturing  
and  
Crystallisation

Future Power  
Networks and  
Smart Grid

Advanced  
Manufacturing

Next Generation  
Accelerators

Medical Devices  
and Health Tech

Wind and  
Marine Energy

Diamond  
Science and  
Technology

Non-destructive  
Testing

Applied  
Photonics

Offshore  
Renewable  
Energy

Optimal Medical  
Imaging

# Strathclyde CDTs

- Strathclyde is a partner in a CDT from each of AHRC, BBSRC, ESRC and NERC.
- 4 rounds of Strathclyde CDTs creating 16 new centres from across the university
- Centres should stimulate engagement with external partners and obtain leveraging – so far more than 50% leveraging obtained.

Fluid-Structure Dynamics

Citizen Politics and Policy

Advanced Functional and Engineering Polymers

Laser-driven Dense Plasma & Fusion Science

Built Environment Futures

Fair, Innovative, and Transformative Work

Communication Disorders

Aero-Electrical Power Systems

Aerospace Science and Engineering

Safety and Risk Management in Transport, Energy, Manufacturing and Environmental Protection.

Health Policy

Quantum Optics and Quantum Technologies

Industrial Biotechnology

Plasma-based Particle and Light Sources (P-PALS)

Social Transformation for Wellbeing

Entrepreneurship and Innovation

# Work in partnership

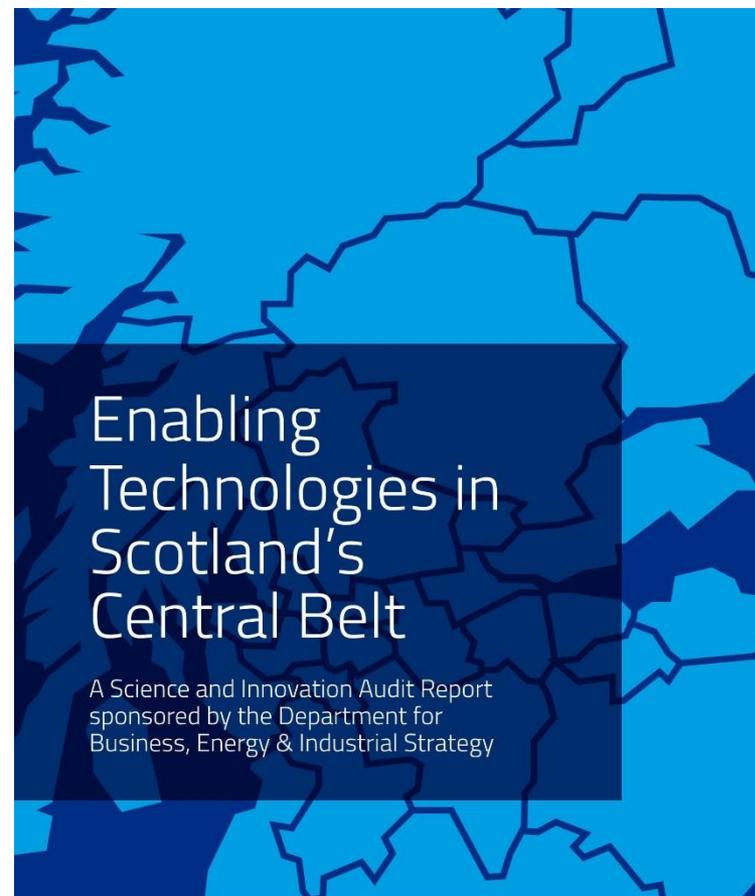


- Research excellence and readiness to invest in relationships are key
- A variety of industry engagement models used
- Trust, sustainable relationships
- Talent and innovation – both doctoral training and collaborative research are key elements of these partnerships
- Corporate venturing (eg SGS)
- AFRC, PNDC, CMAC, ANRC all large collaborative centres, Weir large single company centre
- IAA (1&2) of £1.8M leveraged £960k industry funding and £350k uni funding
- Current EPSRC portfolio of £103M over 82 grants



# Cluster approach

- Key examples of Strategic Industry Research Centres
  - Power Networks Demonstration Centre
  - Advanced Forming Research Centre
  - Centre for Continuous Manufacturing and Crystallisation
  - Advanced Nuclear Research Centre
- Photonics/Quantum cluster
  - Institute of Photonics, Fraunhofer CAP, SUPA, Technology Scotland, NPL Scotland, Stanford Connection (Science Bridges and follow on), International Max Planck Partnership, in all 4 Quantum Tech Hubs
  - Vibrant part of Scottish Enabling Tech sector which contributes 1% of GDP, but 10% of exports, and 17% of Scottish business R&D, investing 5% of turnover in R&D



# Research Pooling

# Research Pooling - why pool?

- Scotland has 19 HE institutions
- Many are relatively small in global terms and can be vulnerable in a global market for investment, researchers and research students
- Scotland's response:
  - agreements between multiple universities to 'share sovereignty' over broad areas of the research base to create virtual 'departments' across Scotland with scale significant internationally
- Able to compete with leading research institutions in the UK such as the University of Cambridge, Imperial College, University College London, the University of Manchester and so on.

# SRPE Engineering



Northern Research Partnership



GRPE  
GLASGOW RESEARCH  
PARTNERSHIP IN ENGINEERING



energy  
technology  
partnership

ERPem  
Edinburgh Research Partnership in Engineering and Mathematics





# Innovation Centres



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



# Scottish Innovation Centres

- “...Scottish Innovation Centres will create sustainable and internationally ambitious open communities of university staff, research institutes, businesses and others to deliver economic growth and wider benefits for Scotland”
- £120 million of core funding for the Innovation Centre programme over five years (2013-18), leveraged further investment from industry and other sources of public funding
- Dedicated PostGraduate Masters programmes

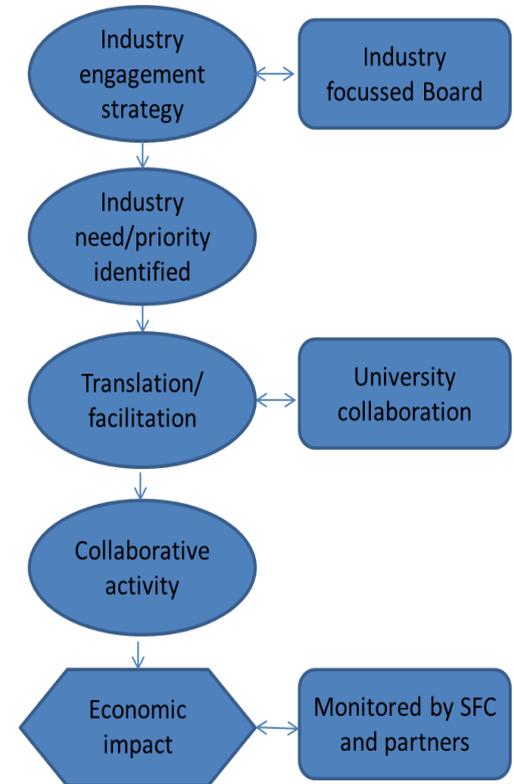
# The funding and delivery model

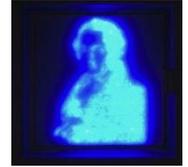
SFC funding for the IC programme over the initial 5 year period:

- £110M for core/infrastructure;
- capital equipment £14M (2014);
- masters level training £2M p.a.;
- challenge funding (up to £1M in 2015).

SFC funding will leverage additional investment from industry, Scotland's enterprise agencies, RCUK, Innovate UK, European Commission (H2020) and others

Bespoke and appropriate delivery models for each IC but all are structured to respond and deliver on demand-led priorities.



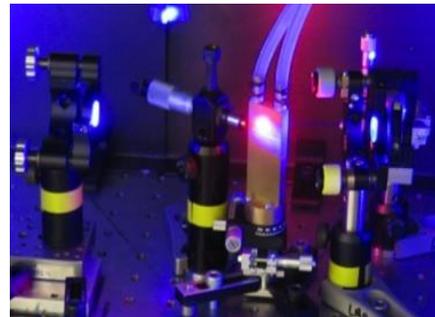


## Fraunhofer CAP

Martin Dawson

Fraunhofer Centre for Applied Photonics CAP, Glasgow UK

Based at the University of Strathclyde



# UK Catapult Centres

- Created as a result of the Hauser report (2010), to provide acceleration of innovation in key areas
- Second Hauser review (2014) underlined progress and called for continued support/expansion
- Has (so far) had cross-party support. Clear strategy – departure from old concerns on “picking winners”
- Still debate about right role for government in Triple Helix approach with differences of approach between Edinburgh and London



# AFRC

ADVANCED FORMING RESEARCH CENTRE

UNIVERSITY OF STRATHCLYDE

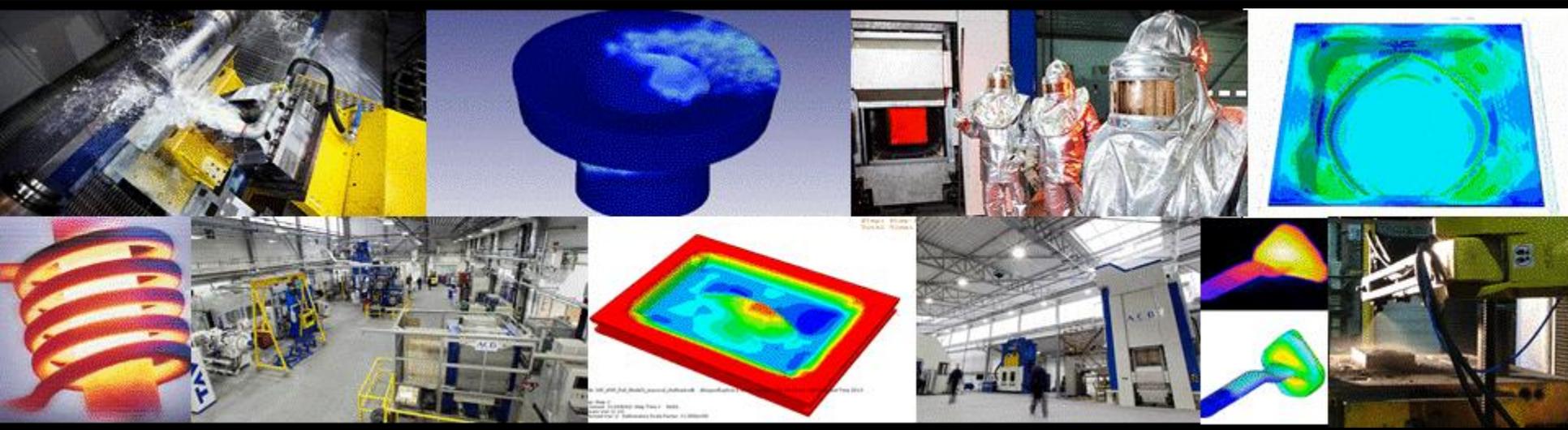


- Founded by University of Strathclyde in 2007
- Collaboration between Industry, Academia & Government
- Founding member of the UK High Value Manufacturing Catapult
- Research focus = manufacture of metallic high integrity components.



# The core of our capability

- A £100m investment in capability
- State of the art industrial scale manufacturing and lab facilities



- Addressing the fundamentals of deformation behavior, prediction and control
- Providing a unique range of solutions for industry

# Our Network...

## AFRC

ADVANCED FORMING RESEARCH CENTRE  
UNIVERSITY OF STRATHCLYDE

### Academic Partners



### Membership



### Government Funding Partners



### Industrial Clients



# Formal Opening of TIC – July 2015....



# Technology and Innovation



High value manufacturing  
and Innovation



nationalgrid

Low Carbon Power  
and Energy



SIEMENS



Future Cities  
and Sustainability



ARUP



AECOM



Health Technologies





Bayer HealthCare




COHERENT




Fraunhofer




[dstl] e2v




- Enabling Technologies
- Power and Energy systems
  - Photonics and Lasers
  - Advanced Sensors and processors
  - Nanoscience, advanced materials
  - Quantum Technologies
  - ICT and Comms



# Continuous Manufacturing and Crystallisation (CMAC)

- Established 2011, Industry led
- £80m Portfolio of funding
  - EPSRC Centre; DTC, ICT
  - £34m UK RPIF Capital equipment
  - £23m AMSCI Supply Chain
- 100 staff and rising : international talent
- Pre-competitive, leverage
- £100m Technology Innovation Centre @ Strathclyde, Glasgow physical hub
- 3 founding tier1s GSK, AZ, Novartis. Bayer joined
- Tier 2 technology companies



# Facilities for Collaboration

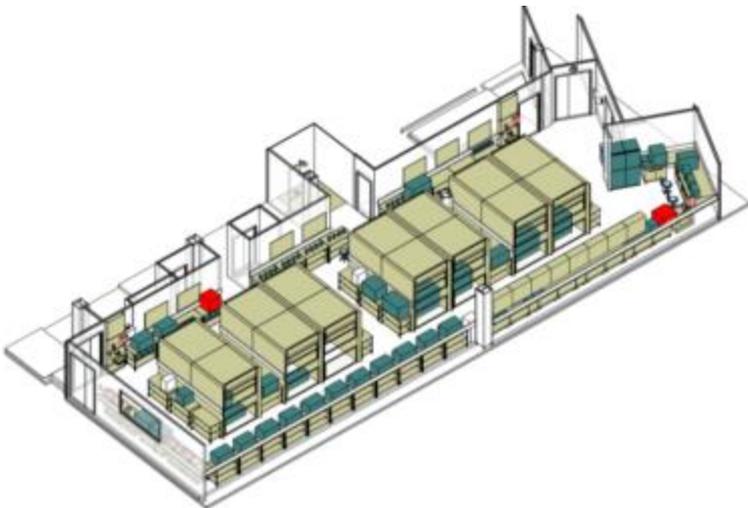


UNIVERSITY of STRATHCLYDE  
**CMAC NATIONAL  
FACILITY**

- Hub Centre
- Co-locate multidisciplinary teams - academic and industry researchers; open, collaborative ethos
- **£16m equipment (RPIF)** to establish a ***World-Class Facility for Continuous Manufacturing and Crystallisation Research for Pharmaceutical Products.***

- **Continuous Processing Equipment**
- **State-of-the-art analysis and characterisation capabilities**
- **Comprehensive suite of PAT tools**
- **Continuous process skids for process development**

***Facilities open to use by wider academic and industrial community ([www.cmac.ac.uk](http://www.cmac.ac.uk))***



CMC03a - Axonometric View 1

# Power Networks Demonstration Centre



# Members and Collaborators



vodafone



HTIP



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INNOVATION

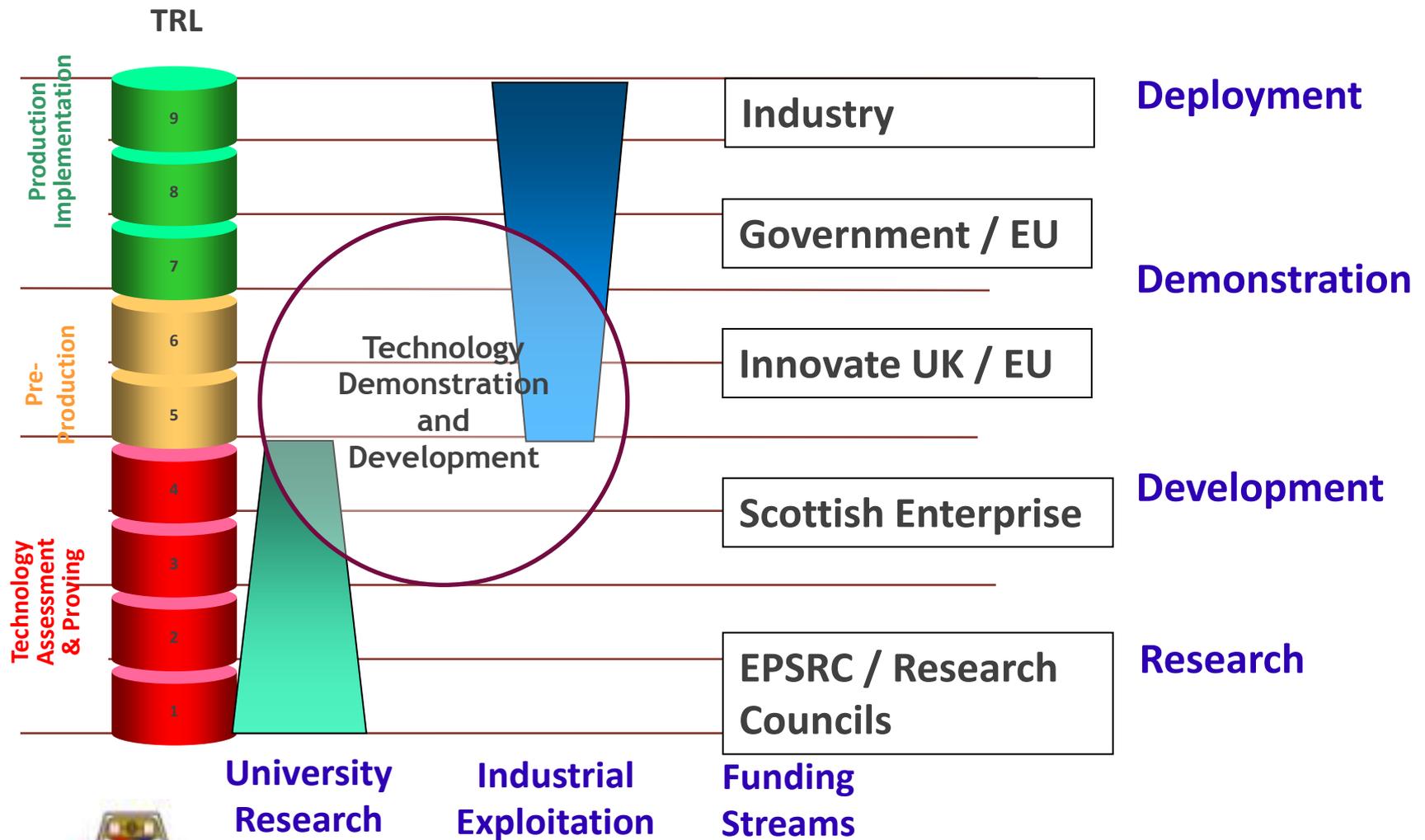
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# Strathclyde's Innovation Strategy

- Creating and accelerating innovation partnerships with private and public sector organisations.
- Building an ***Innovation District*** (ref ***Brookings Institute***) in the heart of Glasgow, with associated Full Scale R&D, Test and Pilot Plant Centres within easy reach.
- Developing and nurturing innovation talent.
- Supporting startups, spinouts and SMEs.
- Applying the best innovation practice and policy, through our new Innovation Research Institute.
- Forming and leveraging national and international networks to attract support, expertise, knowledge and investment.
  
- *Collaboration and Partnership is central to Strathclyde's strategy*
- *We actively support UK and Scottish Governments efforts to build smart, successful partnerships*

# New Innovation - Industry Collaboration





UNIVERSITY of STRATHCLYDE  
**TECHNOLOGY &  
INNOVATION CENTRE**

