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Agile Application of Scientists toward achieving decarbonisation within the FIs

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FISC Circular Economy Theme Lead

HENRY ROYCE INSTITUTE

Glass Futures

cpi

LUCIDEON

Materials Processing Institute

UKRI Innovate UK

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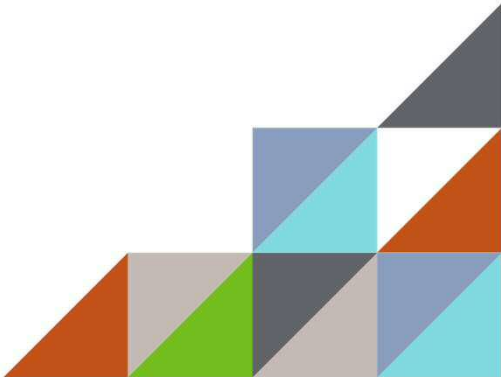

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Who are the Foundation Industry Sustainability Consortium (FISC)?

- A partnership between five research and technology centres.
- The aim being to solve industry innovation challenges to achieve sustainability and net zero objectives.
  - Centre for Process Innovation (CPI)
  - Glass Futures
  - Henry Royce Institute (Royce)
  - Lucideon
  - Materials Processing Institute (MPI)

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How does FISC assist the Foundation Industries?

- Establish, maintain and grow a network of scale-up centres.
- Deliver cross-centre working to address innovation challenges around decarbonisation and sustainability.
- Increase UK industry engagement in scale-up activities and innovation.
- Devise a plan to develop a workforce capable of delivering net zero and sustainability.
- Deliver the EconoMISER1 Programme:
  - Upgrade scale-up facilities.
  - Support translational research through the deployment of Application Scientists.
  - Develop a strategy for translational research in consultation with the manufacturing sectors.

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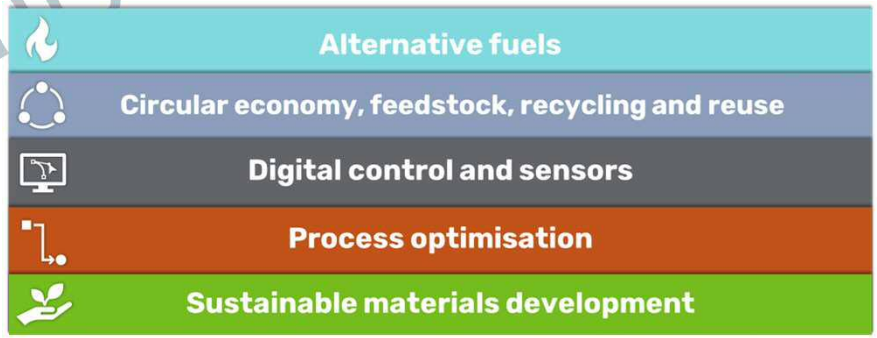
What was EconoMISER1?

- Economic Material Innovation for Sustainable and Efficient use of Resources (EconoMISER)
- The first project of FISC, representing a £19.5m investment by UK Research and Innovation (INNOVATE UK).
- The FISC partners are collaborating on several cross-sector research themes, each theme being led by a single partner who coordinate multi-partner cross centre research activities.
- The funding provided the UK's Foundation Industries with the essential tools needed to decarbonise.

EconoMISER1 - Aims

- Investing capital in existing scale-up facilities to develop a network of scale-up centre to support the FIs.
- Working on five themes to drive cross-centre working to address sustainability challenges
- Offering the enhanced capability to FI companies to increase industry engagement in innovation
- Develop a FISC business case for a sustainable network going forward
- Creating a plan to developing a transformational approach to creating a workforce fit to deliver net zero for the FIs.



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EconoMISER1 - Capex

Partner	Example CapEx
Henry Royce Institute – Circular economy, feedstock, recycling and reuse	Respirometers; DEECOM unit; polymer mill and more…
Glass Futures – Alternative fuels	Forehearth; cullet collection, handling and storage equipment and more…
Materials Processing Institute (MPI) – Sustainable materials development	Upgrade of hydrometallurgical equipment for hydrogen recovery; processing equipment (grinders, ball mills, etc.) and more…
Centre for Process Innovation (CPI) – Digital Control and Sensors	Upgraded sustainable polymer scale-up capabilities (especially packaging) and more…
Lucideon – Process Optimisation	Capabilities for scale-up of geopolymer manufacture from by-products/waste materials from other industries, and more…

However, not just Capex at Henry Royce Institute…

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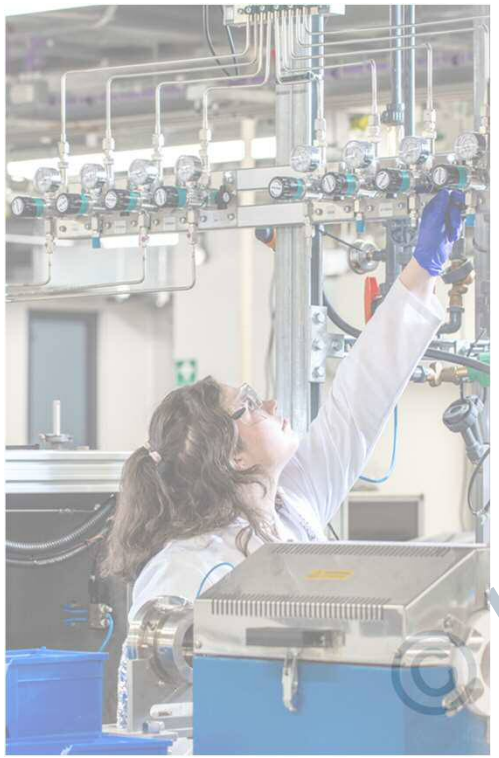
Introducing the Henry Royce Institute

The UK’s national institute for advanced materials research and innovation



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What drives us?

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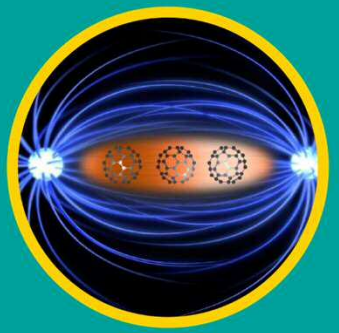
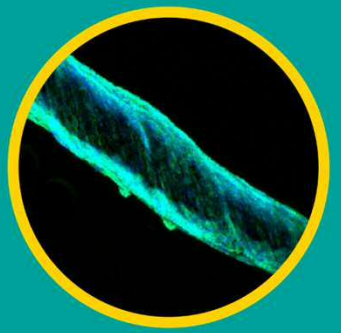
2D Materials

Advanced Metals Processing

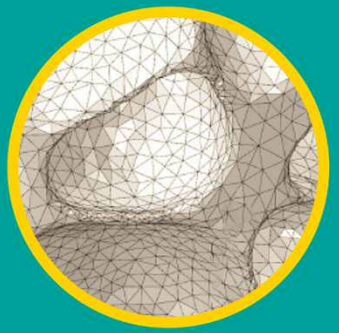
Atoms to Devices

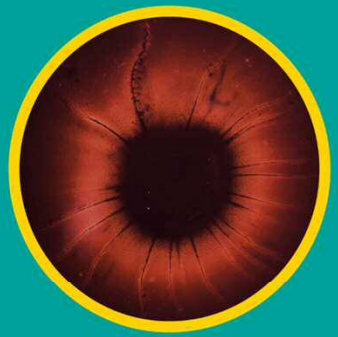


Biomedical Materials

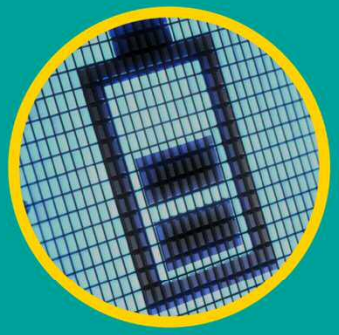


Modelling & Simulation





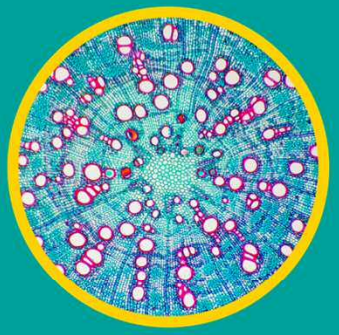
Chemical Materials Design



Electrochemical Systems

Material Systems For Demanding Environments

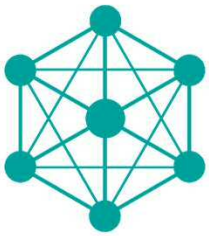
Nuclear Materials



Imaging & Characterisation

ROYCE

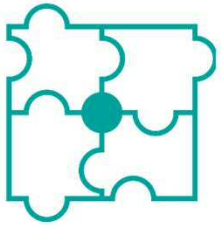
Royce Mission Pillars



Enabling national materials research foresighting, collaboration and strategy

Catalysing industrial collaboration and exploitation of materials research

Providing access to the latest facilities and capability



Fostering materials science skills development, innovation, training and outreach

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Catalysing industrial collaboration and exploitation of materials research

ROYCE

Growing portfolio of Programmes and Activities

MATcelerate ZERO

ROYCE HYDROGEN ACCELERATOR

SUSTAINABLE MATERIALS INNOVATION HUB

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DMEx Defence Materials Centre of Excellence

TATA STEEL

CEAMS Centre of Expertise in Advanced Materials and Sustainability

INDUSTRIAL COLLABORATION PROGRAMME

Mats

Investing in people

Supporting project development and delivery

Industry Fellows

- Experienced industrial leaders
- Identifying and brokering industry/RTO/academia collaborations
- Working with Application Scientists and wider researchers to grow translation pathways

Application Scientists

- Agile research expertise available at short notice
- Scope/deliver multiple ‘sprint’ projects working with industry/RTOs
- Solution focused – exploiting Royce’s capabilities for industry

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EconoMISER Application Scientists at Henry Royce Institute

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What does an Application Scientist do?

- A versatile researcher with specialist technical expertise.
- A new(ish) role within Royce and more widely in UK academia.
- Provide a flexible and agile approach within academia for delivering Sprint projects.
- Identify and respond in an agile manner to demands from industry.
- Develop Sprint project plans based on Royce's world-leading infrastructure together with the capabilities of the FISC partners
- Deliver Sprint projects and achieve results for industry.
- In EconoMISER/FISC a Sprint project was described as a small-scale short-term project (approx. 1 – 6 months) that can be progressed using existing equipment.
- The EconoMISER Sprint projects involved resource based at either a single or multi-FISC partners.

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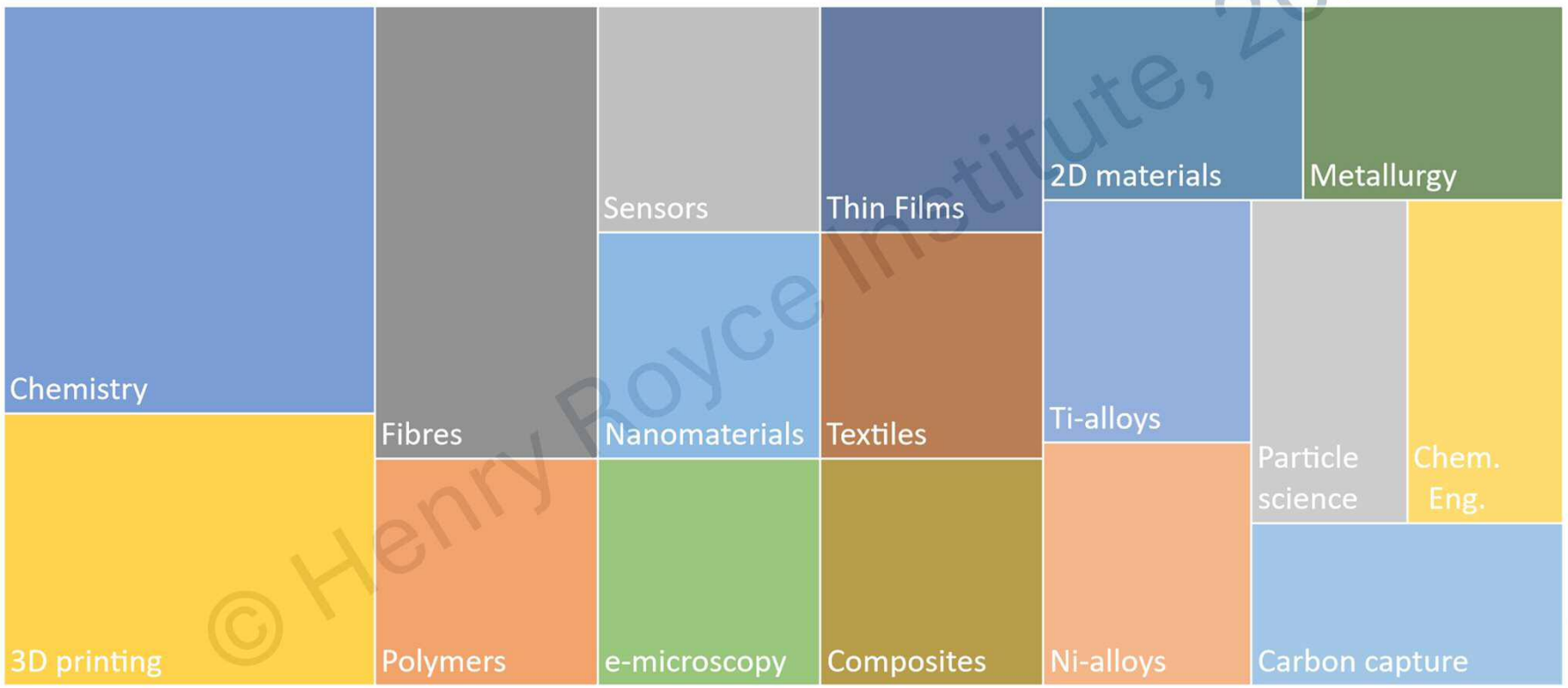
EconoMISER Application Scientist Expertise

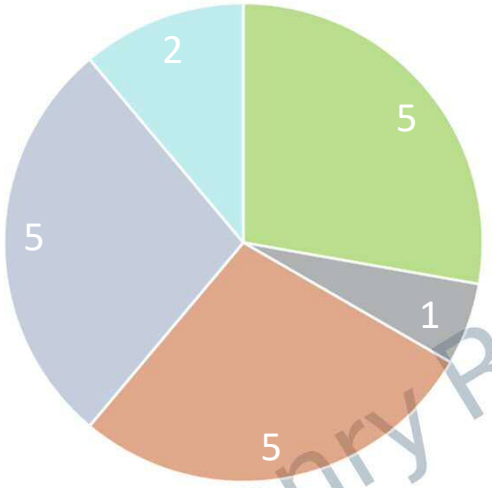


What did Application Scientists achieve in EconoMISER1?

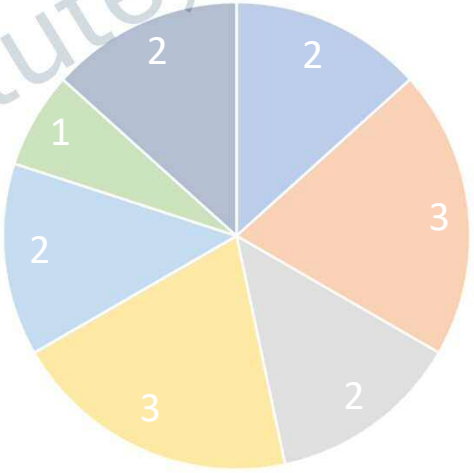
- Contributed to the development of new ways of working and best working practises for:
  - enquiry logging
  - project proposal development and costing
  - project pipeline management
  - resource tracking
- Fostered and grew working relationships with key stakeholders internally and externally
- Assisted with the installation and commissioning of EconoMISER1 Capex
- Successfully demonstrated an EconoMISER Sprint project that involved working at two FISC partners to utilise the unique capabilities at each partner.
- During EconoMISER1, 19 Sprint products were delivered to completion, reported and closed out.
- The first EconoMISER case study has been published.
- The remaining EconoMISER case studies are to be published imminently.

What did Application Scientists achieve in EconoMISER1?

Distribution of complete Sprint projects by theme



Distribution of complete Sprint projects by material



Sprint Project Case Study - Pulpex

- Material = paper/pulp
- Pulpex collaborated with the EconoMISER team at the Henry Royce Institute on a Sprint project to carry out a standard pulp evaluation of the fibre material used in the company's product.
- The analysis addressed non-uniform distribution of fibres and coating performance within the material
- The work also enabled a better understanding of how the effect of pulp beating on the barrier coating performance
- This agile research and development project successfully delivered product samples and data which has informed Pulpex's scale up process – with the potential to significantly reduce the reliance on plastics for packaging solutions.
- EconoMISER Sprint projects, such as this collaboration with Pulpex, demonstrated how Application Scientists based in the Henry Royce Institute can support businesses of any size including those in the translational scale up space.
- Case study is available at https://www.royce.ac.uk/economiser-project/

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Sprint Project Case Study - Pulpex

"We recently collaborated with Royce on an EconoMISER sprint project. The Royce team provided expert assistance in researching and understanding how the mechanical properties of our fibre bottle can be adjusted to suit different applications. High-performance raw materials and advanced processing techniques are critical for the future of high-performance fibre-based packaging. The research conducted by the team within the Royce Facilities at the University of Manchester will help design the next generation of fibre bottles. We are excited to continue collaborating with FISC."

Justin O'Keefe | Innovation / Technology Partnerships Lead, Pulpex

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The present and future for Application Scientists

- The EconoMISER Application Scientist team successfully demonstrated the Application Scientist model
- EconoMISER1 Application Scientist Sprint projects successfully:
  - led to four commercial FI projects at Royce (two of which are direct follow-on activities) that utilise Application Scientists
  - contributed to the successful funding of four research projects.
- These successes ensured that Application Scientists were subsumed into Royce business-as-usual operations, beyond EconoMISER1, forming a core team of Royce Application Scientists
- Royce Application Scientists continue to scope/deliver sprint projects working with industry/RTOs, including Foundation Industries
- A further team of Application Scientists was hired for the CEAMS project
- There are now 18 Application Scientists at Manchester and a further 5 Application Scientists at Royce partner institutes

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Acknowledgements

- Bill Sampson – EconoMISER PI
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  - Chris Grimes
- Royce TFI Fellows
- All the technical specialists and experimental officers

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Thank you for listening