

Towards Engineering Grand Challenges - Intents to submit

This document contains all intents to submit received for the "Towards Engineering Grand Challenges" call; this step of the process was compulsory but does not bind candidates to apply to the call and does not count towards our repeatedly unsuccessful applicants policy.

We expect demand for this call to be high and would encourage applicants to consider working in collaboration where appropriate – this data has been made publically available in order to facilitate this. EPSRC will not be involved in this collaboration building.

Challenge 1 : Sustainable engineering to provide water for all

| PI Name | Lead Institution | Other institutions involved | Title |
|------------------|-------------------------|---|--|
| Ian Thompson | University of Oxford | Newcastle, Bristol, Surrey, Warwick | Plug and play approach for sustainable treatment of industrial waste water at source. |
| Richard Fenner | University of Cambridge | | Integrating multifunctional water supply, energy and wastewater systems to ensure water security - |
| Joby Boxall | University of Sheffield | Imperial College London, University of Exeter, University of Manchester, University of Newcastle, University of Reading | Tailored water solutions for positive impact |
| William Sloan | University of Glasgow | University College, London, University of Newcastle, Heriot Watt University | Sustainable decentralised water technologies: local solutions to a Global problem. |
| Jonathan Bridge | University of Liverpool | Liverpool John Moores University | Sustainable Online Water Purification using Sustainable Urban Drainage Systems (SOWPSUDS) |
| Alastair Martin | Lancaster University | Manchester University, Strathclyde University | New Engineering for the Human Water Loop |
| Thorsten Wagener | University of Bristol | University of Exeter, Cardiff University, University of Bath | Sustainable Across Futures: Ecosystem-services for Gainful Urban And Rural Development (SAFEGUARD) |

| PI Name | Lead Institution | Other institutions involved | Title |
|-----------------|----------------------------|---|---|
| Peter Robertson | Queen's University Belfast | Robert Gordon University, University of St Andrews | Smart Water for All |
| Nidal Hilal | Swansea University | Loughborough University, Sheffield University, Bath University, Oxford University, Aston University | Flexible technological solutions for water purification and distribution (FlexTech) |
| Julien Harou | University of Manchester | Cranfield University, University of Exeter, University of Oxford | Engineering sustainable water systems |

Challenge 2: Future Cities: engineering approaches that restore that balance between engineered and natural systems

| PI name | Institution | Other institutions involved | Title |
|--------------------------------------|--|---|---|
| TBC: Elsa Aristodemou or Alan Robins | London South Bank University, University of Surrey | Imperial College London, London South Bank University, University of Surrey, Cambridge, University of Bristol | The high fidelity interactive virtual city – a framework for design and operation |
| David Butler | University of Exeter | UCL, London School of Hygiene and Tropical Medicine, Imperial College, University of Southampton | Shades of Green: Balancing cities for people and nature |
| Patrick James | University of Southampton | UCL | DIGITAL URBAN GAIA : INFORMED PATHWAYS TO REBALANCING THE CITY |
| C J Baker | University of Birmingham | University of Sheffield | Cities as entropy creating organisms |
| Phil Purnell | University of Leeds | UCL, University of Southampton, University of Birmingham | Balancing the impact of City Infrastructure Engineering on Natural systems using Robots |
| Ray E. Sheriff | University of Bradford | | Employing Information and Communications Technology (ICT) in Future Cities for the Health and Well-Being of the Elderly |

| PI name | Institution | Other institutions involved | Title |
|-----------------|----------------------------|---|--|
| Dina D'Ayala | University College London, | University of Bristol, Cambridge University, University of Newcastle, Centre for Ecology and Hydrology, King's College, BGS, HR Wallingford | RENATURING THE CITY: PROMETHEUS CONSORTIUM |
| David Coley | University of Bath | Leeds University, Imperial College | REBALANCE: Rebalancing the natural and engineered world within cities |
| Paul Linden | University of Cambridge | | Mastering Air for Green Inner Cities (MAGIC) |
| Tim Short | University of Liverpool | Liverpool John Moores University | Adaptive cities: redesigning cities for sustainable futures |
| Helen Reeves | British Geological Survey | University of Birmingham, University of Strathclyde, University of Newcastle | Re-Engineering the Ground's Ecosystem Provision to support Future Cities - – A Rebalancing of Engineered and Natural Systems |
| Darren Robinson | University of Nottingham | | Creative approaches to maximising urban sustainability, resilience and ecosystem services. |
| Richard Dawson | Newcastle University | University of Bristol, University of Sheffield, University of Manchester, Glasgow University, Cranfield University, University of Strathclyde | Future Cities Exchange |
| Matthew Leach | University of Surrey | TBC | "Zero Waste City": waste elimination for energy, water, materials, capital and human effort in urban infrastructures and service provision as the new priority |
| John Polak | Imperial College London | University of Surrey, University of Exeter, University College London | City Bridge: Cooperative and distributed solutions for urban efficiency and resilience |

| PI name | Institution | Other institutions involved | Title |
|------------------|---------------------------|---|--|
| Gareth Pender | Heriot-Watt University | University of Edinburgh | Cities and their hinterlands |
| Miklas Scholz | University of Salford | Cambridge University, Imperial College London, University of Birmingham, Cardiff University , Durham University, Oxford Brookes University , University of Exeter | Decision Support Approaches in Environmental Engineering to Restore the Balance between Engineered and Natural Systems Benefiting Expanding Cities |
| Barbara Maher | Lancaster University | | Smarter urban environments: green innovations in science, engineering and design |
| Prof Greg Keeffe | Queens University Belfast | Manchester School of Architecture, Leeds Beckett University, University College London | Cyclical City: developing a holistic understanding of urban resource cycles that enhances resilience and increase biodiversity. |

Challenge 3: Engineering across length scales, from atoms to applications

| PI name | Institution | Other institutions involved | Title |
|------------------------|---------------------------------|--|--|
| Paul Sherwood | STFC | University of Manchester, Imperial College, University of Bath, Lincoln, University of Bristol | GeMMS. A GENERIC MULTI-SCALE MODELING SUITE OF FLUID-SOLID INTERFACES: WHERE CHEMISTRY, PHYSICS, AND ENGINEERING MEET. |
| Roger C Reed | University of Oxford | University of Birmingham, University of Cambridge, University of Loughborough, University of Manchester. | Alloys-By-Design: Towards Applications via Atoms |
| Kostya Novoselov | The University of Manchester | Manchester, Cambridge and Lancaster | Engineering van der Waals heterostructures: from atomic level layer-by-layer assembly to printable innovative devices. |
| Pankaj Vadgama | Queen Mary University of London | University of Cambridge, UCL, University of Warwick, Imperial College London | Biologically inspired self-organisation phenomena for engineering polymer design |
| Kai Luo | UCL | Oxford University | Hierarchical Design Driven Multiscale Multiphysics Modelling (H1D2M3) |
| Iain Todd | University of Sheffield | Imperial College London, Cambridge University, KCL, Manchester | Engineering Metastability: Developing Novel Alloys for Enhanced Performance |
| Xi Jiang | Lancaster University | STFC Laboratories, University of St Andrews, University of Durham, University of Edinburgh | Sustainable Energy: Carbon Utilisation Research Consortium (SECURE) |
| J(Yiannis) Vardaxoglou | Loughborough University | University of Exeter, University of Oxford, University of Sheffield, Queen Mary University of London | Synthesizing 3D metamaterials for RF, microwave and THz applications |
| Duncan McFarlane | University of Cambridge | | Achieving Perpetual Products Through Smart Surfaces |

| PI name | Institution | Other institutions involved | Title |
|----------------------|---------------------------|--|--|
| Yonghao Zhang | University of Strathclyde | Warwick University, Edinburgh University, STFC Daresbury Laboratory | Controlled nucleation in industrial processes |
| Ian Ashcroft | University of Nottingham | University of Birmingham | Engineering interfaces from single atoms to functional surfaces for next-generation manufacture of high performance products |
| John Weaver | Glasgow University | University of Southampton | Atomistic design of useful systems incorporating custom molecules and nanoparticles |
| Frans Muller | University of Leeds | Birmingham, Hartree Centre, Diamond Light Source | Ten Orders of Magnitude |
| Paul M Weaver | University of Bristol | Oxford, Exeter | Smart Accretion (Growth) and Decay (Disassembly) of Sentient Materials, by Design |
| Daniel W. Hewak | Univeristy of Southampton | University of Cambridge, University of Exeter, University of Surrey, Heriot-Watt University, University of Bristol, University of Oxford | Energy, Electronics and Enhancing Life: Understanding materials on the nanoscale before |
| Jason Reese | University of Edinburgh | Heriot-Watt University | Translating biological principles into engineering processes |
| Stéphane P.A. Bordas | Cardiff University | Swansea University, University of Bath, University of Exeter | Engineering with confidence: Model learning across scales |
| Sandrine Heutz | Imperial College London | | From Atoms and Molecules to Devices: Engineering out the Meso-Gap |

Challenge 4: identifying risk and building resilience into engineered systems

| PI name | Institution | Other institutions involved | Title |
|--------------------------------|----------------------------------|--|--|
| Marian Scott | University of Glasgow | | Resilience,Risk, Ergonomics and Data for Engineered Systems |
| Jennifer Whyte | University of Reading | Cranfield University | Next Generation Configuration Management |
| Guangtao Fu | University of Exeter | Cranfield University, Loughborough University | BRIM: Building Resilience into Risk Management |
| Ajith Kumar Narayanan Parlikad | University of Cambridge | University of Birmingham, University of Nottingham, Cranfield University, University of Salford, Leeds University, Cass Business School, University College London | Resilience of Engineered Systems against High Impact Low Probability Events |
| John Ahmet Erkoyuncu | Cranfield University | University of Cambridge, Loughborough University, LCC University of the Arts | Dynamic simulation and visualisation for enhanced risk and uncertainty considerations |
| Roy S. Kalawsky | Loughborough University | Cambridge, Strathclyde, Birmingham, East London, BGS, Exeter | ResilienceNET - Managing Uncertainty and Risk by Building Resilience in Complex Engineered Systems |
| Jin Wang | Liverpool John Moores University | | REST: Resilience, Safety and Security Technology for Maritime Engineering Systems |
| Roger B Street | University of Oxford | Newcastle University, Manchester University | R2: Risk and Resilience in an interconnected world: Identifying and nurturing research capability |
| Longbin Tao | Newcastle University | University of Strathclyde, University of Cranfield, University of Aberdeen | Risk-based Life-Cycle Management for the Next Generation of Subsea Production System |
| Felician Campean | University of Bradford | John Moores University | Modelling risk and resilience for smart autonomous transportation systems |
| Taku Fujiyama | University College London | | Risk and Resilience Building in Energy Resource Supply Systems |
| Luke Bisby | University of Edinburgh | Heriot-Watt University | Resilience foresight for interdependent infrastructure systems at tipping points |
| Pete Burnap | Cardiff University | | Exploring Real-time Cyber Risks to Smart Grid Networks |

| PI name | Institution | Other institutions involved | Title |
|---------------------|-----------------------------|--|--|
| Martin Mayfield | The University of Sheffield | Cranfield University | Engineering Complexity Resilience Network - EnCoRe |
| Alan Purvis | Durham University | | Regenerative Engineering: enabling complex systems to autonomously maintain and repair themselves. |
| Clive Roberts | University of Birmingham | | Systems Thinking Approach to Railway Control, Operations and Monitoring (STARCOM) |
| Luca di Mare | Imperial College London | | Resilient Engineering For Energy and pRopulsion (REFER) |
| Massimiliano Vasile | University of Strathclyde | University of Sheffield, University of Durham, University of Cranfield | Handling Nonlinearity and Global Optimality in the Design and Control of Complex Dynamical Systems Under Uncertainty |