RESILIENT CITIES

Redistributed manufacturing for resilient and sustainable cities

Over-reliance on large, centralised hubs of manufacturing can leave entire supply systems vulnerable to failures at those single sites. New technologies, such as 3D printing, present a unique opportunity to create downscaled and locally owned production capabilities, a move known as ‘redistributed manufacturing’. A major new network led by Professor Chris McMahon will explore the potential impact of redistributed manufacturing on the sustainability and resilience of Bristol and its outskirts. It is anticipated that the project will pave the way for Bristol to move to smaller and more localised manufacturing in the city.

International Centre for Infrastructure Futures

Infrastructure systems in one sector increasingly rely on other infrastructure systems in other sectors in order to operate. The International Centre for Infrastructure Futures (ICIF) will create a shared, facilitated learning environment in which social scientists, engineers, industrialists, policy makers and other stakeholders can research and learn together to understand how better to exploit the technical and market opportunities that emerge from the increased interdependence of infrastructure systems. The project has already published reports and case studies on the development of an Interdependency Planning and Management Framework (IPMF) for Infrastructure UK, in order to ensure potential interdependencies are considered at an early stage of developments in the future.

Managing the risk of urban floods

Our world-leading global flood models, now being used by the World Bank and Google, are able to identify areas at risk of flooding at an unprecedented resolution. There is now a critical need to understand not only which areas could be affected, but the relative vulnerability of the people exposed in those areas. Dr Sean Fox and Dr Jeff Neal are working to combine environmental, social and political-administrative data from select cities in South/East Asia in an innovative new pilot study. It is hoped that the data and models generated will be used to inform policy and decision-making in developing countries and will help to reduce property damage, injury and death from natural disasters.

ABOUT OUR RESEARCH

The Cabot Institute, the University of Bristol’s first flagship cross-disciplinary research institute, conducts world-leading research on the challenges arising from how we live with, depend on and affect our planet. Given that UN estimates suggest 70% of people around the globe will be living in cities by 2030, future cities research is core to our remit. This leaflet presents a sample of just some of the research underway within the Institute - drawing particular focus on resilient, smart, sustainable and inclusive cities.

Supporting our Rockefeller Resilient City

Giulio Galvan, a researcher focussing on how infrastructure networks and their services change after natural hazards, is part of the Resilient Bristol team put together by the Strategic Resilience Officer – Sarah Toy – and the Rockefeller Foundation. His research will contribute to Phase 1 of Bristol’s Resilience Strategy which is benchmarking the performance and resilience of Bristol’s infrastructure.
SUSTAINABLE CITIES

Delivering a future city

Bristol is forging ambitious plans for sustainable development in the city. In Bristol's European Green Capital year, Cabot Institute researcher, Caroline Bird has convened a series of conversations exploring how Bristol delivers the ‘future city’ looking at what capacities it needs to be resilient, sustainable and successful. Working with the Bristol Green Capital Partnership, these have involved key Bristol academics and city ‘thinkers’ from across public, private and civil society. A policy report will summarise the work - identifying barriers, enablers and opportunities to develop capacity in a time of changing governance and ongoing austerity.

Informing low carbon plans

Our research has directly informed Bristol City Council’s low carbon plan by demonstrating that investment over the next decade could save £200-300 million on city energy bills and create 2,000-10,000 jobs. We have developed a robust model for assessing the costs and benefits of different levels of decarbonisation at a city region scale using data from a wide range of sources. These include potential energy, cost and carbon savings from hundreds of low carbon measures.

Systems thinking for energy planning

The EU FP7 Smart Cities funded STEEP Project (Systems Thinking for Efficient Energy Planning) is a collaboration between the cities of San Sebastián, Bristol and Florence to improve efficiency along all the key aspects of the ‘energy value chain’ to achieve carbon reduction targets. The project worked with a wide range of stakeholders using an innovative participatory problem structuring methodology developed at the University of Bristol and modelled possible transformational solutions.

Creating a sustainable city business model

Building on the successful outcome and partnerships of STEEP, the three cities have recently embarked on a £25M Horizon 2020 Smart Cities and Communities Lighthouse project ‘REPLICATE’ (Renaissance of Places with Innovative Citizenship And Technology). The project will develop and validate a sustainable City Business Model to enhance the transition process to a smart city, with a view to significantly increasing resource and energy efficiency, improving the sustainability of urban transport and drastically reducing greenhouse gas emissions in urban areas.

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INCLUSIVE CITIES

Age-friendly cities

In a major Future Cities Catapult Report ‘Towards the All Age-Friendly City’, Professor Keri Facer and Dr Helen Manchester discuss the importance of designing cities that address the needs of multiple generations, and that foster social encounters between them. The report recommends radical digital innovation and shared spaces that encourage people from all age groups to connect with each other.

Critically these interventions must be co-designed with the people that will use them. An exciting collaboration led by three voluntary organisations in Bristol: Architecture Centre, Room13 and Playing Out, working with Dr Debbie Watson and Dr Helen Manchester will address the exclusion of children and young people in cities. The vision is to develop a blueprint for Bristol as a child-friendly city, co-designed with young people, to increase their inclusion, freedoms and access. Dr Manchester has also worked with colleagues in computer science and history to co-design tangible technologies for storytelling in care home settings across the city.

Driving an inclusive Green Capital legacy

We are enabling discussions with black, Asian, and minority ethnic groups, the Green Capital Partnership, and Ujima Radio to define ways to ensure the legacy from Bristol’s year as Green Capital is inclusive. The work builds upon Ujima’s pioneering ‘Green and Black’ debate and seeks to engage, learn with, and promote existing success stories within Bristol’s diverse community.
SMART CITIES

Creating an open, programmable city

The University of Bristol and Bristol City Council have launched a major high-speed wireless network, Bristol Is Open, which aims to improve our understanding of how we can best use the latest technology to overcome challenges to city infrastructure. This project is a worldwide first and links the internet to a range of physical sensors strategically placed throughout the city of Bristol – in the ground, on street level, and wirelessly along the Brunel Mile. The sensors monitor air pollution, citizen health and traffic, heat and water levels. The University of Bristol’s BlueCrystal 2 super computer collects this information, enabling scientists and city planners to understand the overall health of the city. Future observations will be used in guiding planning and policymaking, as well as developing new ways to streamline city operations.

Enabling collaboration

Professor Colin Taylor is leading the Bristol-based strand of a collaboration between 13 universities, which hopes to secure £138 million in funding for a UK Collaboratorium for Research on Infrastructure and Cities (UKCRIC). The initiative will build on the achievements of Bristol Is Open (BIO) and its recasting of Bristol as a ‘living laboratory’.

It will do this by creating physical spaces and opportunities for people to collaborate across sectors and disciplines, access city data, and experiment for change. This ‘collaboratory’ will be a hub for city experimentation and learning where researchers and end-users can observe and analyse city infrastructures, through a City Operating System (CityOS).

Defining the skills gap

Smart infrastructure presents major opportunities for cities of the future - helping us to anticipate and respond to hazards, become more sustainable, and be more responsive to citizen needs. However there is a critical lack of people with the skillsets required to fully exploit these opportunities. Work by Dr Theo Tryfonas has highlighted the need for digital skills for citizens as well as entrepreneurship, creativity, design, computational and systems thinking capabilities.

STUDENT ACTION

100,000 hours committed to local action

University of Bristol and UWE students have contributed over 100,000 hours of volunteer and research time during 2015. As part of the initiative, the Cabot Institute has supported postgraduate students to find ‘real world’ dissertation projects with local and national partners. The projects help students to build skills and experiences required by future employers whilst offering valuable resources to often under-funded community organisations. Our students help to develop business plans for local organisations and have already contributed research on everything from carbon markets to local authority delivery models to biodiversity.

WITH THANKS TO OUR COLLABORATORS AND FUNDERS

We would like to give special thanks to our collaborators and funders who have been supporting us to develop our future cities and communities research. These include: The government’s Super Connected Cities programme; Innovate UK; EPSRC; ESRC; HEFCE; Google; the World Bank; the Future Cities Catapult; Bristol City Council; UKCRIC; Bristol 2015; Bristol Green Capital Partnership; Ujima Radio; Foresight; Government Office for Science; RCUK; Architecture Centre; Playing Out; Room 13 Hareclive; donors to the Cabot Institute; University of Bristol academics and centres and all future collaborators.

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The Cabot Institute, the University of Bristol’s first flagship cross-disciplinary research institute, conducts world-leading research on the challenges arising from how we live with, depend on and affect our planet. It is rooted in a recognition of social and environmental challenges but inspired by the spirit of exploration personified by John Cabot (Zuan Caboto) and the City of Bristol.

Our main themes focus on the six major issues at the centre of the human-planetary relationship: global environmental change, food, water and energy security, natural hazards and future cities and communities.

Each of these themes comprises dozens of academics from disciplines spanning the entire university and partners from government, industry, civil organisations and the public. Within each theme we harness world-leading strength in risk and uncertainty assessment, modelling and big data analysis (underpinned by £4M investment in high performance computing), and expertise in knowledge co-production, security and governance.

Crucially, the Cabot Institute brings these themes – each vibrant in its own right – together. These are strongly interconnected challenges; and interconnected challenges require integrated solutions. The inclusion of a Future Cities theme is a unique feature of the Cabot Institute, arising from our strong partnership with the city of Bristol (European Green Capital 2015) and a recognition that addressing global environmental challenges must be based on a robust understanding of how we live.

The Cabot Institute is a unique and intellectually diverse community. It is a forum for vigorous intellectual discussion. It is a catalyst for the discovery of new, potentially radical, ideas. And it is an incubator for the development of new solutions.

To achieve these ambitions, the Cabot Institute will continue to grow – via strategic appointments and new partnerships. We will build on our core strengths but increasingly integrate academics and partners into more creative, broad and intellectually-challenging conversations. We will share with wider society, we will listen and we will challenge, in order to develop a shared response to 21st Century challenges.

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