

FEATURE
— *Tackling
Global Diseases*

Two years ago researchers at the University of Sheffield were encouraged to think big, to come up with ideas that could turn into large-scale projects with real impact on the international stage. Discover looks at two projects that are already taking shape as a result of the 2022 Futures initiative that will transform our understanding of disease and the delivery of new therapies.



IMAGINE –
Imaging Life

A multi-million pound investment in super-power microscopy, coupled with the appointment of leading researchers in physics and the life sciences, will put the University of Sheffield at the hub of an international network of institutions drawing different disciplines together in a way that will transform our understanding of biological systems through imaging.

“By 2022, we will be defining the agenda for combining and harnessing key advances in three microscopies – optical, electron and atomic force – that will enable us to delve deep into the internal architecture of complex biological systems,” said molecular biologist and project leader, Professor Simon Foster.

The *Imagine* project, with its £6 million investment in state-of-the-art technologies and facilities, will be supported by the appointment of eight senior researchers across a range of disciplines with expertise in single molecule optics; super resolution microscopy; the newly discovered field of cell biology; and radical 3D imaging techniques in the fast-changing world of electron microscopy.

“Imagine will deploy a team of 28 research supervisors across eight scientific and medical departments in a way that will promote a more open and collaborative approach between the disciplines such as chemistry, physics and biology,” Professor Foster said. “Our goal is not to do more of the same, but to do something very different. We will do that by linking the three new technologies with one another; strengthening the multi-disciplinary nature of our research teams; and working with global partners to exploit these technologies to the full.”

The new project also has close relationships with a number of leading edge, private sector manufacturers of super power microscopes. “Our collaborative approach extends to the manufacturing community who are very interested in supporting our work and in learning from our experience of using their equipment to refine its performance,” Professor Foster added.

Imaging research is now critical to advances in medicine, biology, chemistry and physics. In addition to this, new imaging technologies are translating into applications in healthcare and manufacturing.

www.sheffield.ac.uk/imagine
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**THE FLOREY
INSTITUTE**
*for Host-Pathogen
Interaction*

Winning the war against rapidly evolving super-bugs is at the heart of a powerful partnership between frontline clinicians and a multi-disciplinary team of academic researchers who will challenge the increasingly ineffective traditional approach to combating pathogens.

The *Florey Institute* – named after Howard Florey who held a chair at the University of Sheffield and conducted the first clinical trials in the use of penicillin – will bridge the gap between those who pursue the science underpinning our understanding of the interaction between bacteria and an individual’s immune system and clinicians who interact directly with patients to provide effective treatment.

“This is a common divide but the Florey Institute will bring these two fields of expertise together to develop effective solutions quickly, providing a forum that will bring staff across many departments together, including the work of the Imagine team,” says Professor Moira Whyte who heads the Department of Infection and Immunity at the Medical School.

Professor Whyte, a renowned respiratory physician, and her colleague Professor David Dockrell, Professor of Infectious Diseases and Head of the Academic Directorate of Communicable Diseases at Sheffield Teaching Hospitals, have seen at first hand how the evolution of resistant pathogens is reducing the arsenal of drugs that doctors can use to treat disease, and are determined to look for radical new ways of approaching the problem.

“The traditional paradigm of infectious disease management has been compromised by the development of widespread anti-microbial resistance, the limited pipeline of novel antimicrobials and the rapid evolution of micro-organisms in the face of the immune pressure exerted by existing vaccines,” she said.

This now represents a serious global health risk and, in the UK, strategies to deal with disease outbreaks due to resistant organisms are the remit of the Government’s COBRA Committee.

“We will radically alter the potential to diagnose, prevent and treat infectious diseases. It will transform immunisation strategies and anti-microbial treatments by providing a critical focus on the host aspect of the host-pathogen interaction and how the pathogen subverts this,” Professor Whyte said.

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