

INNOVATION insights

THE LATEST INNOVATIONS, COLLABORATIONS AND TECHNOLOGY TRANSFER
FROM THE UNIVERSITY OF OXFORD

ISSUE 17 June 2021

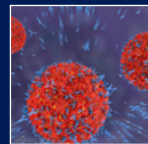
BUILDING OXFORD SOCIAL VENTURES

Oxford University Innovation has now produced 11 social ventures since launching its social ventures programme in 2019.

Other articles include:



Smart glazing for
Industrial applications ►



Stabilised viral
fusion proteins ►



An early warning system to
detect clinical deterioration ►



Deep clustering for phenotyping
complex diseases ►



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Maximising social, cultural and economic benefits from research

Turning commitment into action

Spinouts and startups that have a realistic prospect of commercial success attract support from within the University and from external investors – they are relatively easy to launch.

However, it's often inappropriate or even impossible to monetise ventures that address fundamental societal needs, many University researchers work in fields that have the potential to address those needs, and OUI's mission is to "...maximise the global impact of Oxford's research and expertise." If profit is not the driver, VCs are less likely to be supportive, even though such ventures are set up to be financially sustainable. So what is to be done?

For OUI and Oxford, the answer has been to invest in support for Social Ventures – companies whose primary purpose is to create social, cultural or environmental benefits. In this special edition we're celebrating the formation of 11 Social Ventures from Oxford, and marking the collaboration with 11 other universities to launch Impact12, a fund to support social venture creation around the UK.

Also in this issue we introduce the latest technologies from Oxford available for commercial development – diagnostics and therapeutics in the life sciences, and improved production methods that promise both efficient smart glazing and eco-friendly Metal-organic frameworks (MOFs). Finally, we welcome Dr Emilie Syed to lead OUI's hugely successful Incubator. After producing 12 start-up companies over the last three years we are expecting an increase in the incubator's momentum as we come out of lockdowns due to the pandemic.

With best wishes from everyone here at OUI, we welcome your feedback.



News



Oxford spinout aim to be the first British company to produce sustainable meat

Ivy Farm Technologies plans to become the first commercial producer of sustainable, cultured meat* in the UK.

*Also referred to as 'cellular meat', 'cultivated meat' and 'lab-grown meat'

FULL ARTICLE ►



Oxford University start conservation fund

Venture capital firm, Global Accelerated Ventures, and OUI have launched the world's first venture capital fund using conservation technologies from Oxford University.

FULL ARTICLE ►



Quantum breakthrough for Quantum Motion

Quantum Motion, quantum computing startup, has made significant developments that will advance the viability and production of quantum computers.

FULL ARTICLE ►



Nanopore signals IPO on the horizon

Oxford Nanopore, real-time high-throughput DNA/RNA sequencing company, is gearing up to go public with a valuation between £4bn to £7bn.

FULL ARTICLE ►



Building Oxford Social Ventures



Oxford University Innovation has now produced 11 social ventures since launching its social ventures programme in 2019. OUI is also partnering with 11 other universities including the University of Cambridge to launch Impact12, a fund focused on stimulating social venture creation in a number of ecosystems across England. We spoke with Mark Mann, OUI's social venture lead and architect of both the social venture programme and Impact12, to discover more.

What is a social venture and why do we need them?

A social venture is a company which has a mission and a purpose locked in and stated in its articles of association. This protection from the company's very inception guides the directors in the decisions they make in while pushing the entity forward. The way this differs from a regular company is that the mission, values and purpose of a social venture is to always have a positive social, environmental or cultural objective at its heart.

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We need social ventures because the world increasingly has a number of big problems that need big solutions. In addition, there's a desire for greater transparency in how companies can solve these issues. By putting a value other than profit at the core of a social venture, we can ensure that these companies achieve their goals in a way that minimises harm and remain focused on delivering positive and radical change.

Why does the University of Oxford support social ventures?

University of Oxford research generates a wide range of fantastic ideas that can help humanity at large. The question is how to we turn those ideas into impact. We already have Oxford Sciences Innovation and others helping us push some of these ideas into the wider world. But for the typical ideas we're seeing for social ventures, the mainstream VC model doesn't fit. The business model is different, plus it doesn't seem right to be making a massive profit out of them, especially for something that targets the developing world, for example.

Social ventures offer our academics another way of solving the world's problems with Oxford ideas. These vehicles give us an option to create mass impact and change while fitting into the economic models upon which the world runs, and to create them in a sustainable fashion that can generate a return that allows them to stand financially independent and capable of continued growth without grants or dependency on the state.

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What ideas can you develop with a social venture?

A good way of thinking about how we can use social ventures are the Sustainable Development Goals. These highlight problems the United Nations has said needs to be solved, and include issues such as climate change, social inequality, health and wellbeing, and education. In solving these issues, we need to ensure that the outputs are available to everyone in the world, not just developed nations. It is, after all, the developing nations that need them the most.

All these issues require solutions that deliver large scale change and cannot be addressed with a traditional profit-centric model. It's still early days for our social ventures programme, but so far we've got a company helping a business helping workforces out of poverty, one that's helping the homeless on the streets of Oxford, and another delivering low-cost medical training around the world. So to answer the question, social ventures can deliver the big ideas to solve the biggest problems.

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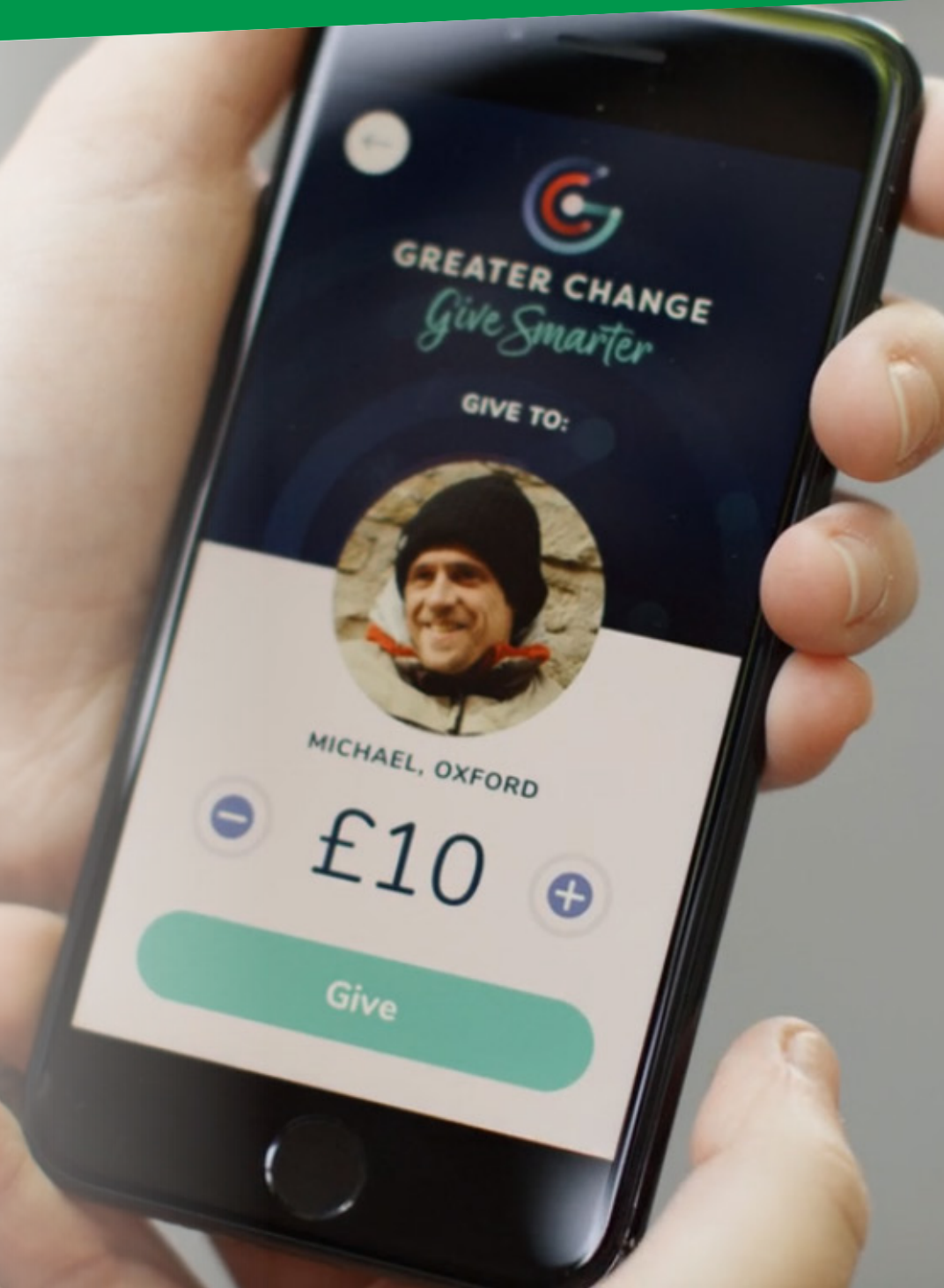


What has prevented universities from creating social ventures before?

To be honest, the answer is capacity. University innovation as a whole has done the mainstream thing because it was the easiest to solve. Oxford in particular has shown great strength and growth in this area, building an ecosystem capable of generating and growing spinout companies capable of delivering both economic and societal impact. However, ideas which underpin social ventures tend to need an entirely different support mechanism – we can't just slap a patent on them, give them some VC funding, and see what happens.

So while social ventures are rapidly growing, support is still more limited than for mainstream university innovation activity, and we're still building the infrastructure to give them what they need. Social ventures need the right resources – the right people in the companies, the right talent supporting them and bespoke funding – to accelerate impact from these companies.

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What support mechanisms need to be created to support social ventures?

You need incubation and acceleration services where you can train teams up and put them together. These teams need to know how to run a social venture and how to develop a social venture model. You also need funding that takes the ideas through from research through to larger million-plus investment rounds, with focused grants, funding, and equity investments. At the pre-seed stage grants work best, but to connect impact projects to the best impact funder requires a platform. We're working with [Fund4Impact](#) of the Saïd Business School to connect social ventures with the European Venture Philanthropy Association. For seed stage, Impact12 will provide equity and loans.

What is Impact12?

It is a collaboration of 12 universities that's bringing together our resources in terms of funding and ideas to accelerate and support the growth of social ventures. The members are a mix of the ancient universities and their massive research centres, and newer universities at the heart of their communities that are working collaboratively to solve their problems. The initiative brings together a pipeline of ideas and expertise.

The aim is to bring together social investors, and we hope this fund will be the first of many.

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Fund4Impact



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Why are social ventures important to the future of the UK economy?

Following the huge instability since the 2008 financial crisis plus the aftermath of Brexit and the pandemic, there has been an increase in social and environmental problems that the Government cannot solve alone. Using entrepreneurship in conjunction with the government is going to be key to maximising the recovery and solving those problems.

Also, in all the communications that I've been having with the University and associated partners, including high net worth individuals, there is a desire for people to feel a purpose to their lives. They want to feel that they are working towards something that can have meaning. They increasingly want to shift their efforts and resources to good-and are creating a rising tide that raises all boats.

People come to me and say you've got an amazing job and it's wonderful what you're doing. I tell them that this is what happens when you put a value beyond profit at the heart of what you do. It's my ambition that through social ventures, many more people will be able to discover a sense of meaning and the power of positive impact in their work.

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Tropical mother and child, Annie Spratt



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11 Social Ventures

Since OUI launched the social enterprise service two years ago, it has helped academics and students at the University of Oxford launch eleven social ventures.



Rogue Interrobang Limited

Rogue Interrobang is a spinout company from Oxford University, founded by two-time Creative Thinking World Champion Dan Holloway to help institutions and individuals change the way they think and act to use creativity to solve problems.

rogueinterrobang.com



Oxsed Limited

Oxford University spinout, Oxsed, enables the new normalcy with rapid, accurate and scalable COVID-19 testing. Oxsed was acquired by Prenetics in November 2020. The terms of the deal mean that the diagnostic test will be made available to low- and middle-income countries.

oxsed.com



Enabling research by sharing knowledge

The Global Health Research Accelerator C.I.C.

The Global Health Network enables easier, faster, and better research in the world's most challenging settings.

tghn.org



Greater Change C.I.C.

GreaterChange is a nonprofit enterprise that helps individuals become free of homelessness.

greaterchange.co.uk



sOPHIA Oxford UK Limited

SOPHIA Oxford enables businesses to incorporate key social indicators into sustainable business practices that improve the impact of their social investments and the lives of their employees.

sophiaoxford.org

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OpenClinical C.I.C.

OpenClinical provides tools and techniques to empower healthcare organisations to share knowledge of best practice in specialist fields, create and publish applications, trial them at the point-of-care and translate new research into routine services.

openclinical.net



Orbit RRI

Orbit RRI is jointly formed between Oxford and De Montford working on responsible research and innovation in information and communications technologies.

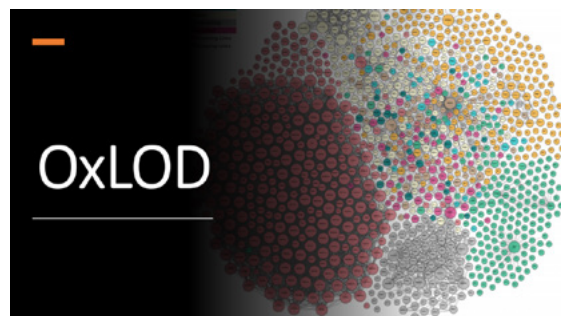
orbit-rri.org



Skylark Works Limited

Skylark Works is a purpose-led consultancy providing practical business support to organisations delivering positive social impact in the UK and beyond.

skylarkworks.com



OxLOD Limited

OXLOD was a Linked Data pilot project for the University of Oxford's Collections. As a spinout, it is now expanding to cover linking all expert data for the benefit of the world.

glam.ox.ac.uk/oxford-linked-open-data-pilot



OxVent Limited

Rapidly deployable and scalable low-cost mechanical ventilator specially designed for Covid-19.

oxvent.org



Global Campus Limited

More information coming soon.
Spun out November 2020.



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Smart glazing for Industrial applications

Polymer Dispersed Liquid Crystals (PDLCs) devices are a type of smart glazing or film material where liquid-crystal droplets are suspended in a solid polymer matrix. When an electric field is applied to the material, the alignment of the liquid crystal director within the droplets reorients, changing the appearance of the film from translucent to transparent.

Common applications of PDLCs include smart glass used in architectural buildings, consumer electronics and automotive vehicles. PDLCs give dynamic control over the glass transparency for privacy, thermal efficiency, and aesthetic purposes.

Researchers at Oxford have developed a method that uses inkjet printing technology to create designs and motifs using PDLCs. The method is highly efficient, scalable, and cost effective.

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An early warning system to detect clinical deterioration

Increased access to Electronic Health Records (EHR) has motivated the development of data-driven systems that detect physiological derangement and secure timely response.

Commonly predicted adverse events such as mortality, unplanned ICU admission and cardiac arrest, have been extensively investigated by early warning systems, such as the National Early Warning Score that is currently recommended by the Royal College of Physicians in the UK.

However, physiological data recorded in EHRs are often sparse, noisy, and incomplete, especially when collected in non-critical care wards. Missing information is often dealt with through complete-case analysis, population mean imputation, or carrying the most recent value forward. Such practices may impose bias and error and do not account for the uncertainty of the data.

Scientists at the University of Oxford have developed an end-to-end framework which provides data pre-processing, patient-specific data modelling, and generates early warning scores to prevent adverse events which directly affect patient outcomes when undetected.

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Curator: advanced curation of real-world clinical data

Statistical analysis of real-world clinical data offers insights that can support new therapeutic developments and inform decisions about healthcare delivery.

However, datasets must be validated and managed to ensure robust, accurate analysis and high-quality outcomes.

Curator, an innovative data science tool from researchers at the University of Oxford, consistently saves time, reduces costs and improves both research quality and reproducibility.

This expert-level tool performs automated data engineering, data mining and advanced curation on electronic health records to provide tailored clinical datasets. Data are efficiently, accurately, and consistently curated and delivered in a format that is ready for statistical analysis.

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Plasmid stabilisation for use in *Shigella* vaccine development

Shigella species bacteria are the leading cause of bacterial dysentery in the world, responsible for over 150,000 deaths per year. Young children living in low-income countries are at highest risk. *Shigella sonnei* is responsible for most cases in developed countries and is the cause of increasing numbers of cases in middle-income countries.

Despite the clear need there is no *Shigella* vaccine currently available. Growth of *S. Sonnei* at 37°C in the laboratory results in frequent loss of a plasmid which is a key determinant of virulence in this bacterium and is critical to the effectiveness of a vaccine.

Researchers at the University of Oxford have developed a method to stabilise this key plasmid making it possible to develop a multi-valent *Shigella* vaccine that is effective against *S. Sonnei*. This stabilisation technique could also have significant use in biomanufacturing situations where plasmid stabilisation is desired.

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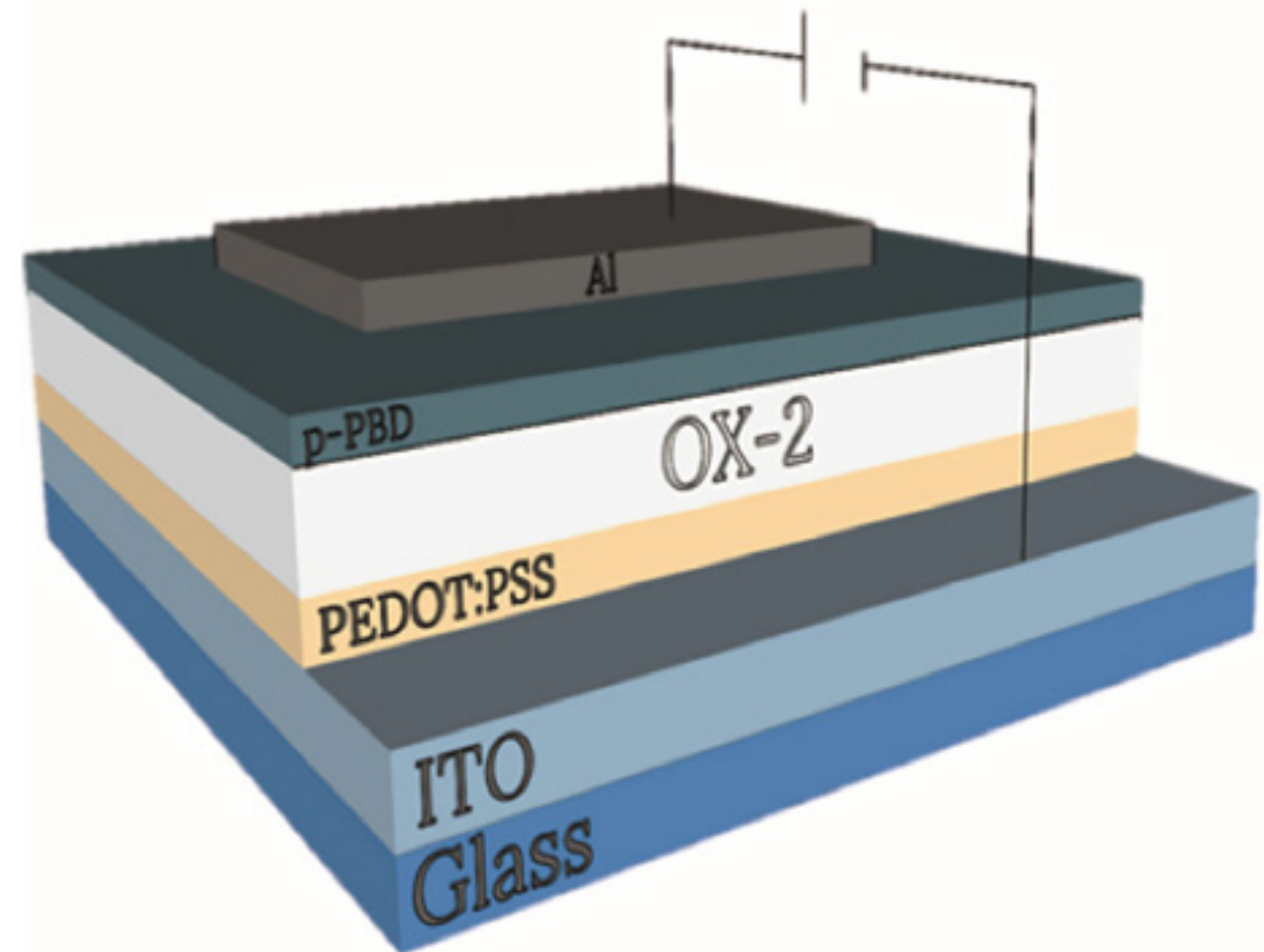




Eco-Friendly MOFs

Metal-organic frameworks (MOFs) are advanced materials made from metal ions connected by organic linker molecules. MOFs, which are typically used in sensing applications, can be designed from different metals and linkers to target specific end-use applications. Current production of MOFs is not eco-friendly. It is currently a long complex process using toxic solvents (N,N-dimethylformamide, methanol) in harsh high temperature and pressure environments.

Researchers at the University of Oxford have developed a fast method of producing large amounts MOF material. This uniquely eco-friendly method uses water as a solvent and allows processing at room temperature and pressure. The method has been applied to produce a specially designed MOF - a highly emissive silver metal based LMOF, invented and named as OX-2 by Oxford.



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The Startup Incubator going from strength to strength

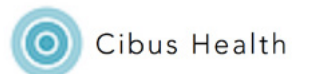
Under the stewardship of Catherine Spence the Incubator has grown and flourished. The number of startups assisted by Oxford University Innovation has more than doubled, reaching over 70 companies.

This has been the result of a growing pipeline: in the last 12 months alone, the Incubator has had more than 150 enquiries and accepted over 52 teams, supporting more than 100 entrepreneurs.

Cath has inspired a great diversity of budding entrepreneurs with a continuous effort to reach out to the entirety of the University ecosystem in all its breadth and variety. This has led to the hugely successful Student Entrepreneurs Programme (StEP), which brought students to the Incubator from disciplines not usually inclined to entrepreneurship. In parallel, Cath has also worked tirelessly towards increasing the Incubator's network of investors, mentors, and industrial partnerships, organising numerous events and workshops to the benefit of Oxford's entrepreneurial ecosystem.

As Cath now hands over the reigns to Dr. Emilie Syed, from OUI's investments team, we are excited to see what more the Incubator will have to offer.

If you would like more information on how the Incubator can support an early stage startup venture, please contact incubator@innovation.ox.ac.uk



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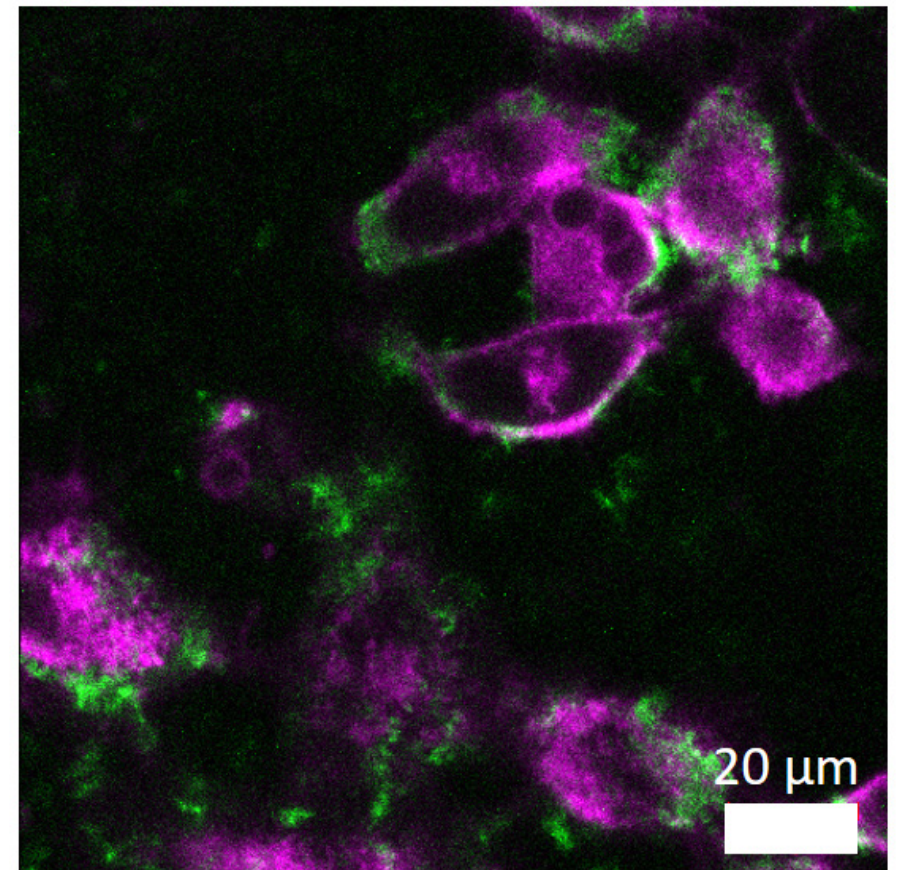


Researchers use microbubbles to target immunotherapy

Gas microbubbles, coated with a surfactant or polymer shell, are an effective type of contrast agent for diagnostic ultrasound imaging. The gas core of the microbubbles scatter ultrasound more efficiently and over a wider range of frequencies than biological cells, producing strong contrast between the vasculature and the surrounding tissue.

Targeted drug delivery can be achieved by incorporating the drug into the encapsulating shell of the microbubbles.

Delivering proteins to the cell membrane in a controlled fashion has proven extremely challenging in the development of cancer immunotherapies; requiring complex *ex vivo* procedures. Oxford researchers address this challenge by exploiting microbubbles' ability to incorporate surface membrane proteins into their lipid shell and transfer them to a target cellular membrane in a controlled fashion under ultrasound exposure.



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Stabilised viral fusion proteins

Viral fusion proteins mediate fusion of the viral envelope with host cell membranes, allowing viruses to enter host cells. This protein's efficacy as a vaccine can be improved by stabilising viral proteins in a pre-fusion conformation on the surface of virus particles.

Class III fusion proteins represent important vaccine immunogens, and are targets of neutralising antibodies with a protective effect. However, some of these antibodies are known to bind only in the pre-fusion conformation.

Researchers at Oxford University have identified a region that when mutated prevents Class III proteins from transitioning from the pre-fusion to post-fusion conformation. By stabilising the pre-fusion conformation, the invention allows enhanced yields of proteins bearing pre-fusion conformation-specific epitopes which elicit the production of neutralising antibodies *in-vivo*. This enhanced yield, together with long term stability and antigen quality is advantageous for vaccine production.

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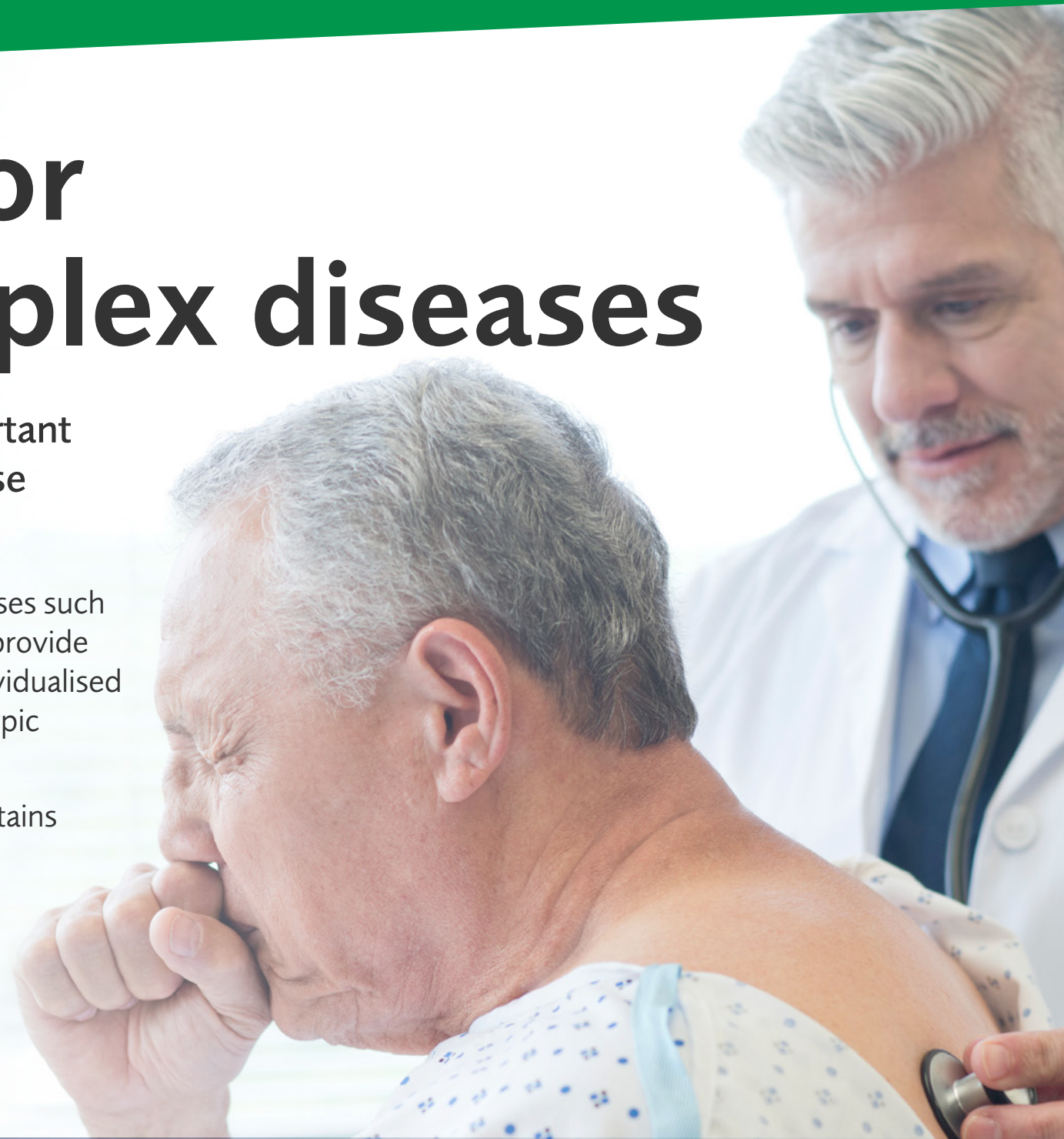
Deep clustering for phenotyping complex diseases

Classification of phenotypic types and subtypes is important for both clinical care and research into underlying disease mechanisms.

Detecting phenotypic subgroups of patients suffering from complex diseases such as Parkinson's disease and Chronic Obstructive pulmonary disease could provide support for early detection of deteriorating patients, determination of individualised and customised treatment, and prevention strategies for different phenotypic groups, which ultimately results in enhanced treatment outcome.

Scientists at the University of Oxford have developed technology that contains detailed data curation and pre-processing steps along with state-of-the-art machine learning techniques for accurate identification of phenotypic groups in patient cohorts for complex diseases. The software enables risk stratification for pre-hospital stay patients by extracting primary diagnosis and data processing.

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IMPORTANT NEWS FOR OUR OIS MEMBERS

Oxford Innovation Society (OIS) meetings are currently suspended, and will resume as soon as feasible. We are preparing alternative means of engagement and will communicate details to members once arrangements have been made.



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A space for innovation

Agile Lab - a shared space to develop and commercialise scientific research

Housed within the Centre for Innovation and Enterprise (CIE) at The University of Oxford, Begbroke Science Park; the Agile Lab gives pre and early-stage start-up companies the space and support for proof of concept and prototype studies.

The space comprises two large wet-chemistry laboratories with shared equipment, a dedicated laboratory technician and adjoining shared office/write-up spaces.

Access to all the CIE facilities, business-support, meeting rooms, café and restaurant are all included.

Low initial rental cost: £500/month for the 1st term gives the tenant their own 1.8m bench space with access to the fume hoods, lab equipment and write-up space.

Flexible tenancy: Six months minimum with one month notice period. We can also offer virtual tenancies for science-based companies who do not need a lab – please enquire.

Begbroke Science Park is growing, be part of the CIE community.

For more information contact: enquiries@begbroke.ox.ac.uk



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