SHOWCASING COLLABORATION:

COLLABORATION IN CRISIS

Highlighting university and business partnerships formed in response to the Covid-19 pandemic

SUMMER 2020
INTRODUCTION

Collaboration in crisis is the first in the National Centre for Universities and Business’ (NCUB) new quarterly showcasing series. Each quarter we will focus on a different theme under which we will celebrate and share the best of NCUB member collaborations.

Dr Joe Marshall, Chief Executive of the NCUB: “World over, no country, region, organisation, household or individual has avoided the impact of Covid-19. As governments, international agencies, global corporations and institutions have been contending with the spread of Covid-19, universities and business have stepped up and united. This collaboration has been the backbone in the national effort against the outbreak.

Almost immediately in fact, universities and businesses rose to the challenges faced by the pandemic. They began to carry out vital medical research into a vaccine, they manufactured and made crucial lifesaving ventilators and breathing aids, and created hand sanitisers and PPE for those on the frontline. Together, businesses and universities from across the UK have been working tirelessly to join the fight against the virus.

In this booklet, NCUB has collated ten collaboration case studies from across the country. These case studies just scratch the surface of the incredible collaborative work that NCUB members have been involved in. There are hundreds of collaborative examples that could have been featured in this document. Collaboration in crisis is a chance to celebrate the lifesaving work these institutions have been carrying out during Covid.”

CRISIS IN COLLABORATION’ IS A CHANCE TO CELEBRATE THE LIFESAVING WORK THESE INSTITUTIONS HAVE BEEN CARRYING OUT DURING COVID.”

Contents

Creating a vaccine 1
Hand sanitiser and PPE 2
Ventilators 3
Symptom study app 4
Testing for Covid-19 5
Covid-19 in pregnancy 6
NHS mental health and Covid 7
Blood oxygen monitors 8
Breathing aids 9
Building alliances 10
CREATING A VACCINE

The coronavirus pandemic has changed life as we know it in just a few short months. In April 2020, it was announced that AstraZeneca and the University of Oxford were working together to develop and distribute a vaccine aimed at preventing Covid-19 infection from SARS-CoV-2.

Dr Phil Clare, the Deputy Director (Knowledge Exchange and Engagement) at the University of Oxford provides insight into the collaboration.

On the University of Oxford timescales in developing the vaccine

“As soon as the genetic information was published by Chinese researchers, existing vaccine projects were immediately put on hold, and all efforts were directed towards finding a Covid-19 vaccine. We changed focus straight away, with no hesitation.”

“The University’s work on vaccine research is by no means new – the Jenner Institute and the Oxford Vaccine Group have been working for many years on vaccines and have spoken before on the need to be ready for a global pandemic. This is what sets the University of Oxford apart, and is why we were very well placed in working with AstraZeneca on a vaccine from the start.”

On the University of Oxford’s relationship with AstraZeneca prior to the crisis...

“Oxford didn’t have a strategic relationship with AstraZeneca prior to Covid-19, but the collaborative work we are doing with them now on the vaccine shows how endless the possibilities of university-business collaboration are – there needn’t be a strong existing relationship in place to work together on ground breaking projects in the future. This project is now a foundation of a strong relationship between Oxford and AstraZeneca.”

Why AstraZeneca?

“AstraZeneca’s thinking and values fit very neatly with the University of Oxford’s – we work well together – it’s a refreshingly positive collaboration. Both parties had the same views, intent and aims from the outset – this is the starting point of a successful collaborative relationship.”

What’s worked well in the process so far?

“The urgency of Covid-19 meant the timescales for the vaccine collaboration were much faster than an average partnership would be; time is of the essence in the battle against Covid-19. We both have teams that are fundamentally committed to getting a vaccine produced, working all hours of the day and night on both sides.”

Why the partnership works...

“AstraZeneca committed huge numbers of people from their legal teams, their manufacturing teams, their technical teams and their finance team to work with Oxford’s researchers who bring expertise in vaccine design, clinical trials and manufacturing and this all forms part of the knowledge exchange.”

“Although it is Oxford and AstraZeneca at the heart of the collaboration, there are many different collaborations happening behind the scenes, for example, a whole host of universities are helping with the clinical trials.”

HAND SANITISER AND PPE

Healthcare professionals rely on personal protective equipment (PPE) and hand sanitiser every single day to protect themselves and their patients from the spread of germs and infectious diseases. But now, in the midst of a global pandemic, PPE is more important than ever. Across the nation, universities and businesses have risen to the challenges posed by the pandemic and have joined forces with businesses to create invaluable PPE supplies and hand sanitiser for both frontline workers and also local communities.

Just a few examples of these universities include...

University of Dundee
A collaborative project between the University of Dundee, NHS Tayside, local industry, and community volunteers delivered almost 6,000 sets of scrubs for frontline staff.

University of Chester
The University of Chester donated all remaining stocks of 3% Hydrogen Peroxide to Cheshire based Weetwood Ales & Distillery to create much needed hand sanitiser which was distributed locally free of charge and given to frontline workers.

Bangor University
Bangor University was at the heart of a community effort to design, print, assemble and provide vital PPE visors to the NHS using 3D printers. Over 30 3D printers were used to create visors for frontline workers.

University of Huddersfield
The University of Huddersfield’s Supply Chain Programme enabled Leeds based SMEs to manufacture vital products, such as hand sanitisers, face masks, scrubs and visors. The programme helped SMEs to establish connections with larger companies, so that their life saving products were able to penetrate the supply chain more effectively.

University of Plymouth
The University of Plymouth formed part of a city-wide consortium providing 3D-printed face shields to frontline staff during the Covid-19 pandemic. The consortium was put together in the space of a few days and created hundreds of visors that were used on the frontline.

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#collaborationincrisis #collaborationincrisis
VENTILATORS

A ventilator can offer the best chance of survival for those suffering with the most serious symptoms of Covid-19. Simply put, a ventilator takes over the body’s breathing process when disease has caused the lungs to fail. UK Universities formed many partnerships to create ventilators, often using alternative materials to avoid potential bottlenecks for demand, a few examples of these exciting collaborations are:

**Durham University and vacuum cleaners**

Early in Covid-19 lockdown, a Durham MBA graduate contacted Dr Joanna Berry at Durham University Business School. Working alongside a fellow Durham University engineering graduate at a regional company, they worked overnight to create a 3D-printed ventilator. It was powered by a vacuum cleaner engine that one of the team had brought in from home.

This simple, easy to create, power and operate, portable and cost-effective solution to the UK’s shortage of ventilators, faced logistical problems. It needed official recognition as a viable unit by the medical device accreditation bodies.

Dr Berry communicated with colleagues and external contacts to ensure the team gained the right expertise. An anesthetist advisor clarified how they needed to get the ‘knobology’ right. It needed, importantly, to ‘breathe’ at the right rate and a real ventilator was required to match the specifications of the first few iterations against.

This required dedication and commitment from a complex, multifunctional, interdisciplinary team. The School worked with Research Innovation Services, the Department of Engineering, the Durham Energy Institute, and the Centre for Advanced Instrumentation in Physics.

A fellow Durham MBA alumnus at Parker Hannifin helped with filter prototyping and another at the Northern Health Science Alliance Ltd. gave guidance. Stanley Black & Decker supplied vacuum cleaners for the device’s engine.

Expertise, facilities and contacts were provided by those at Teeside University, the Army Servicewomen’s Network, County Durham and Darlington NHS Foundation Trust and the Government’s Department for Business, Energy and Industrial Strategy, Dyson and RAF Leeming.

As a result, the product now works and does what it needs to. At the time of writing, the UK does not have the urgent need for ventilators but there are still many places where availability could save lives. The team are reaching out to organisations working in disaster zones, virus-led or otherwise, to see where next the Durham Ventilator can go.

**University of Bristol collaboration: Automotive parts**

The University of Bristol contributed to a Belgian-led effort to develop open-source Covid-19 ventilators made from automotive components, to support hospitals during the peak of the coronavirus outbreak.

The project focused on using parts from the automotive industry in order to avoid depleting valuable supplies of medical equipment. A crowdsourced budget was used to purchase several automotive parts, such as windscreen wiper motors and electronic components.

The team’s initial aim was to design and build 10 industrial quality ventilators which could operate for at least one week, but have actually built 50 ventilators so far. White initially focused on helping meet Belgian demand, the project team is now investigating possible deployment in Jordan, Brazil, Canada, Italy, and Spain.

The University of Bristol worked with Vrije Universiteit Brussel who coordinated the project between academic and industrial organisations, including Audi Brussels, Mazda, Renault, Mercedes-Benz, Ford and Volvo to name just a few.

SYMPTOM STUDY APP

Covid-19 is a new virus which the world has never seen before. There are a wide range of symptoms, which differ between people and scientists are constantly learning and gathering more insight into the virus. Millions of people have so far helped researchers by downloading and using the Covid Symptom Tracking App. By self-reporting their symptoms daily, they have each helped to slow the spread of Covid-19.

The Covid Symptom Study app has been developed by health science company ZOE, with data collected and analysed by scientists from King’s College London and ZOE research teams.

As of July 2020, more than 3.9 million people in the UK, US and Sweden have downloaded the app and are using it to report daily on their health status, enabling scientists to potentially predict Covid geographical hotspots up to a week in advance of traditional measures such as positive tests, hospitalisation or mortality.

Using app data, scientists from King’s College London were able to demonstrate the significance of anosmia (loss of taste and smell) in the UK at the beginning of April, which is potentially an even stronger predictor than the more commonly known symptom of fever. In mid-May, anosmia was included in the Public Health England’s official list of coronavirus symptoms.

Through the data provided, researchers have also developed a machine learning (ML) model that predicts cases of coronavirus in users who have not had a test but have logged symptoms in the app. The ML model is trained to identify which combination of symptoms and user characteristics are most predictive of coronavirus, based on users who have had Covid swab tests. Researchers say this may provide help for populations where access to testing is limited.

Professor Tim Spector, lead researcher, said “We have been totally blown away by the public’s response to the app. On the first day we saw one million members of the public download it, making it one of the most successful first days for an app ever, and already probably the UK’s largest citizen science project.

The altruism of the UK public combined with modern technology is allowing us to rapidly collect huge amounts of invaluable data to help us better understand this deadly virus.”

In the future, using app data, researchers from King’s will also be uniquely positioned to investigate long-term outcomes of Covid-19, including mental health, disability, mortality, and financial outcomes.
TESTING FOR COVID-19

Testing for Covid-19 is key to tackling the virus and is crucial to slowing the spread. Universities up and down the nation have collaborated with businesses to find new ways to test patients with suspected Covid-19 symptoms and test for antibodies. Defeating Covid-19 requires a collective effort from those working in healthcare, and these universities were committed to playing a part.

A few of the universities that were involved are:

The University of Aberdeen
The University of Aberdeen and biologics company, Elasmogen Ltd, worked in collaboration with other partners to develop a pregnancy style tests for Covid-19 which could give a result within half an hour.

Bournemouth University
Bournemouth University academics worked with staff at Poole Hospital to support the ability to perform diagnostic testing for Covid-19. The University studied the hospital’s capability to conduct testing and made suggestions in support of setting up testing for the virus to support the national effort.

Queen Mary University of London
Queen Mary University of London provided support to the UK Lighthouse Labs Network – the national Covid-19 diagnostic lab network. As well as donating a number of laboratory machines, a team of research staff were seconded to help test thousands of samples from NHS workers every day.

Imperial College London
Imperial College London, in partnership with IpsosMORI, led a major programme of home testing for Covid-19 to track the progress of the infection across England.

University of Birmingham
The University of Birmingham both tested for Covid-19 and worked on an antibody test:
• Luas Diagnostics and the University of Birmingham worked together to develop a saliva-based, rapid test for Covid-19 antigen.
• Within 10 weeks, the University of Birmingham and The Binding Site produced a world-leading, highly sensitive antibody test, that will soon be available to the NHS and will play a vital role in control of this pandemic and the evaluation of new vaccines. The Birmingham test detects antibodies in people who only suffered a mild form of the SARS-CoV-2 infection, but nonetheless have generated an immune response to the virus.

The University of Cambridge
The University of Cambridge collaborated with both AstraZeneca and GSK to set up a new testing laboratory on campus. The laboratory was used for high throughput screening for Covid-19 testing and to explore the use of alternative chemical reagents for test kits in order to help overcome supply shortages.

COVID-19 IN PREGNANCY

Covid-19’s impact on pregnancy has not yet been studied in detail. The studies that have been carried out have very high levels of uncertainty in their findings. The University of Birmingham has been working with the World Health Organization (WHO), to offer insight into Covid-19’s global effects on pregnancy.

An online resource bringing together research on the effects of the global Covid-19 pandemic on expectant mothers and their babies has been launched by maternal health experts from the University of Birmingham that could help to inform guidelines and treatment pathways.

The PregCOV-19 project, led by the WHO Collaborating Centre for Global Women’s Health at University of Birmingham, aims to evaluate the rapidly emerging evidence on maternal and offspring outcomes and risks in women with suspected or confirmed Covid-19. The team, from the University’s Institute of Metabolism and Systems Research, will combine existing evidence in the form of published primary studies, and update the findings on a regular basis as new information becomes available.

Led by Shakila Thangaratinam, Professor of Maternal and Perinatal health at the University of Birmingham and co-lead of the WHO Collaborative Centre for Global Women’s Health, the project will not only assess the quality of each study but begin to identify global patterns. These patterns could in turn help to shed light on a number of key research questions including the risk of Covid-19 in pregnancy and postpartum, how symptoms of the virus present in pregnancy as well as potential complications for both mother and baby and the risk of mother-to-child transmission either intrauterine, during delivery or after childbirth.

Findings will be shared via an online portal aimed at healthcare professionals and the academic community.

Professor Thangaratinam said: “While there is a remarkably high-volume of evidence on the virus’ effects during pregnancy and postpartum that has emerged in a relatively short space of time, the quality of evidence is varied. Our global collaborative project offers a platform to rapidly integrate new evidence as they emerge through living systematic reviews and to report the key findings.”
The Centre for Mental Health has said that half a million people in the UK may experience mental ill health as a result of Covid-19. Health workers faced particular strain during the pandemic, with levels of anxiety, loneliness and stress being heightened. This has been monitored by The University of Roehampton in collaboration with various NHS Trusts, in their important mental health study for healthcare workers:

Led by Dr James Gilleen from the University of Roehampton, the COVIDA study will help to build a picture of the mental wellbeing of NHS and non-NHS healthcare workers during the Covid-19 pandemic, and how their mental health has changed, and continues to change, as the pandemic evolves.

The team conducted a large-scale survey asking healthcare professionals about their stress, anxiety and mood and how they were coping at this time. Questions were also asked about their recent experiences of working in health care, their concerns about PPE, Covid-19 workload, personal risk as well as the potentially positive aspects such as resilience or motivation. By doing this, the study aims to determine factors which may worsen the impact on their mental health and which factors may help individuals.

In sum, this research is designed to reveal the scale of the burden on health workers, raise public awareness of this critical issue, as well as provide a foundation to develop new strategic approaches, which may be able to reduce the psychological burden on our health workers. With sufficient funding, the study team aims to develop a new intervention which specifically targets the driving factors that are critical to preventing worsening mental health.

Dr James Gilleen said that “the burden on health workers’ mental health is an extremely urgent public health problem that needs urgent comprehensive investigation. The COVIDA project will provide much needed evidence of what factors drive up the symptoms of poor mental health in UK healthcare professional working during this or future pandemics, so they may be directly targeted to improve mental wellbeing.”

Researchers at the University of South Wales (USW) developed an innovative blood oxygen monitor, after supplies became limited during the Covid-19 pandemic. In collaboration with Welsh Government, Panasonic UK and clinicians in Hywel Dda University Health Board, the device, known as a pulse oximeter, was designed to be manufactured locally and break away from the standard oximeter supply chains, effectively eliminating future sourcing bottlenecks.

How does it work?

The oximeter clamps onto a patient’s finger allowing clinicians to monitor the level of oxygen in the bloodstream, and importantly the performance of their lungs. It also has the potential to allow clinicians to remotely assess Covid-19 patients at home and determine appropriate and early lifesaving treatment.

The team of researchers not only turned around the concept from first principles to prototype in just two weeks but have developed a product that importantly will provide high accuracies at lower oxygen levels, an essential requirement for effective Covid-19 treatment.

The team developed 20 prototypes and undertaking testing against manufacturing standards such as medical EMC and passed. The product was also submitted for a fast-tracked MHRA (Medical and Healthcare products Regulatory Agency) approval so that they could be used by the NHS and other care providers as soon as required.

Nigel Copner, Professor of Optoelectronics at USW, said: “After discussions with Welsh Government, it became evident that we could really help the NHS by developing a superior low cost pulse oximeter that could be manufactured locally, avoiding potential bottlenecks for demand, cutting delivery times and creating a new supply chain within Wales and the UK.”
BREATHING AIDS

For patients with severe respiratory problems, a common symptom of Covid-19, a Continuous Positive Airway Pressure (CPAP) device can help them breathe more easily. CPAP devices are used when oxygen via a face mask alone is insufficient. In mid-March, the spread of Covid-19 across Europe stimulated the formation of a unique, interdisciplinary consortium of engineers, critical care consultants and manufacturers. Non-invasive ventilation devices were delivered to the NHS, at a pace to match the Covid-19 surge.

The impact – UK

The Department of Health and Social Care ordered 10,000 devices. The UCL-Ventura team brought together engineers at UCL and Mercedes AMG High Performance Powertrains (HPP) with critical care consultants at University College London Hospital (UCLH) – one of the largest UK teaching hospitals. The UCLH team had been in close contact with colleagues in Italy and China – their experience showed that mechanically ventilating patients soon overwhelmed their healthcare systems. Mechanical ventilation is highly invasive, requires sedation, and has a long recovery trajectory. By comparison, early treatment via a CPAP device alleviated 50-60% of patients from progressing to mechanical ventilation.

The engineering challenge

With a national shortage of CPAP devices, the UCL-Ventura team focused on innovating and manufacturing at pace, reverse-engineering the off-patent Philips Respironics WhisperFlow. The first prototype was designed, manufactured and tested on the wards at UCLH within 100 hours. The Mark I UCL Ventura gained MHRA approval in 10 days, with approval for the Mark II device following days later. The manufacturing excellence provided through Mercedes AMG HPP was pivotal. Machines that would normally produce F1 components were used for manufacturing the CPAP devices.

The impact – international

The consortium released full design and manufacturing instructions as no cost. These blueprints have been downloaded by more than 1,800 times from 105 countries around the world. Teams have begun manufacture and hospital testing of devices in Brazil, Bulgaria, Canada, Colombia, Germany, India, Iraq, Mexico, Russia, South Africa and the US. The UCL-Ventura team continue to work with international organisations and the UK government to provide technical and manufacturing support to in-country teams.

The University of Leeds has joined forces with a number of international businesses to form an independent alliance: The Emergent Alliance. The Emergent Alliance’s aim is to create a safe environment in which they share data, expertise and resources to work together to aid economic recovery in 2020 and shape a new normal.

The Emergent Alliance is a not-for-profit community of businesses, public services and non-governmental organisations. Leeds Institute for Data Analytics (LIDA), at the University of Leeds, was among a small group of founding members, alongside international business firms including Rolls-Royce, IBM and Google Cloud.

Activities are structured around a series of Challenge Statements, which articulate the social and economic problems to be addressed. These challenges are embedded in themes which consider future demand for products and services, labour markets and skills, and local and global responses in the coordination of recovery.

A successful outcome from one of these challenges would include an enriched understanding of a phenomenon. For example, what insights does public transport use during the pandemic yield for policy makers – how might the reconfiguration of social distancing rules in a railway carriage permit increased ridership and therefore boost recovery?
SUMMARY

Without collaboration, we wouldn’t have taken such important steps towards tackling Covid-19. Research into a vaccine, building ventilators with alternative materials to bypass a bottleneck, studies into the impacts on the mental health of our front-line workers and symptom tracking apps wouldn’t have been possible without it.

This booklet is a chance to celebrate the lifesaving work our universities and businesses have been carrying out during Covid. It is a chance to raise awareness and champion the work that these organisations have done through this crisis.

These examples just begin to scratch the surface of the incredible collaborative work that UK universities have been involved in. NCUB looks forward to featuring more collaborative examples throughout this showcasing series.

Without a doubt, everyone in our society has benefitted from University and Business collaboration.

konfer

Future collaboration: konfer – connecting UK academics and businesses

The case studies in this booklet demonstrate how vital collaboration is. UK universities are bursting with innovation and konfer was created by NCUB to make this astonishing wealth of expertise and resources accessible.

konfer maximises engagement between universities and business, who together will build a more innovative, productive and inclusive future for the UK. It’s free to use.

Find out more at www.konfer.online
The National Centre for Universities and Business (NCUB) is an independent and not-for-profit membership organisation that promotes, develops and supports university-business collaboration across the UK.

Get in touch:
For more information please contact NCUB at: info@ncub.co.uk
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