A LEGACY OF IMPACT
Highlighting the activities of Oxford University Innovation in 2019
Oxford University is recognised worldwide as an institution that creates impact. Traditionally, this impact has been seen in two forms: the quality of its teaching, and of its research. The University’s alumni have led countries and piloted global organisations, written books and poems which have touched millions, and conceived ideas that have fundamentally changed how we perceive the world around us. The University’s research shines a light onto society and our shared history, takes our understanding of the human body and the world we inhabit to new heights, and helps humanity unveil the stories of the universe itself.

It is on this solid bedrock of the brightest minds and the most brilliant ideas that we are now forging a third pathway for Oxfordian impact: innovation.

Oxford University Innovation (OUI) has worked tirelessly over its 30-plus years of operation to transform Oxford research into reality. Over that time, we have created a steady stream of companies based on Oxford ideas including:

- NaturalMotion, zoology-based animation software behind some of the biggest entertainment releases of all time
- YASA Motors, which recently set up a manufacturing plant for its electric car motors
- Oxford PV, which raised over £60m this past year to further develop its next generation solar cell technology, and many more.

OUI went from four spinouts in 2013 to 24 for the calendar year of 2018.

Oxford PV’s perovskite-on-silicon solar cells in pilot production.
These companies and established spinouts like them have built solid foundations for the Oxford innovation ecosystem. From my perspective at the helm of OUI, it is in the past five years where things began to get really interesting. The first company in our records for 2014, OUI’s 104th company, was Nightstar Therapeutics – a spinout formed with the ambition of producing genetic treatments for rare inherited ocular conditions. Although we didn’t know it at the time, Nightstar would fire the starting gun for the Oxford Boom – a massive explosion of entrepreneurship and innovation from Oxford University and the wider Oxford Cluster.

During that time, we saw NaturalMotion sell for $527m. Oxford Sciences Innovation (OSI), which manages the world’s largest university fund with more than £600m in the bank, came into being. OUI went from four spinouts in 2013 to 24 for the calendar year of 2018 – setting a new UK record for spinout generation, both in a single year and most spinouts created overall. The Foundry, the Bioescalator and Creative Destruction Labs all established themselves in Oxford, enhancing the innovation output of the University.

As a result, OUI celebrated the creation of its 200th company this year – at the time of writing, we’re at 216. Consequently, we’ve created more companies based on Oxford ideas in the past five years than we have in the rest of Oxford’s 800-plus year history. As for Nightstar, it went on to become Oxford’s biggest exit when it was acquired by Biogen for over $800m in 2019.

Our work hasn’t just been limited to the sciences. Our social enterprise initiative, launched at the start of this financial year, has led to the creation of two social ventures so far: sOPHIa, a multi-dimensional poverty fighting index, and Greater Change, an app which enables secure, cashless donations to the homeless. We also welcomed Professors Sarah Whatmore and Daniel Grimley, from Social Sciences and Humanities respectively, to OUI’s board, giving us pan-University leadership for the first time in our history.

Our incubator continues to grow under its new leadership, creating three new startups this year with many more in the pipeline. We have launched the Bright Sparks programme with Vodafone to bring in mentors from the communications giant, launched a new equity and financial support programme for startups called Future Fusion, and have been working with OSI and the Foundry to inspire the next generation of Oxford entrepreneurs with the Student Entrepreneurship Programme.

OUI continues to find ways to enable innovation within the Oxford community. Through Consulting Services, OUI connects academics with external organisations looking to harness their technical expertise. Our Clinical Outcomes team had a stellar year, granting 756 licences, 85% of which were free of charge. Together with our partners, we also launched a sister fund to the drug discovery partnership LAB282: LAB10x. The new fund will accelerate data-driven healthcare technology projects around the University towards commercialisation.

Collectively, with our colleagues in the University and our friends externally in the Oxford Cluster, we’re building a lasting legacy of impact. Within this report, you will find how OUI’s work impacts on healthcare and other technologies, how it is shaping our potential futures, how we’re generating economic and societal impact, and how we’re evolving the very nature of university innovation.
BUILDING THE ECOSYSTEM

OUI’s core mission is to build a world leading innovation ecosystem with the University at its heart. This means our activities stretch far beyond spinouts. We’re working to support our academic base, to inspire the next generation of Oxford entrepreneurs, and to build an innovation community which allows the companies we work with and those in the Oxford region to thrive.

There are myriad reasons for doing so. We want to ensure that ideas with the potential to improve human lives and make the world a better place get a chance to have an impact. To do that, we must provide a fertile environment for our entrepreneurs and companies to thrive, bringing game-changing Oxford ideas to the wider world at pace. We believe there are significant societal and economic benefits to doing so, not least giving the UK a competitive edge on the global stage by strengthening its world class scientific and innovative base.

In practice, accomplishing this goal means that OUI takes on a number of additional roles beyond company generation, creating opportunities for impact both within the University to support our colleagues, and in the wider Oxford region.

The Clinical Outcomes team had a stellar year; completing 756 licences during 2019 of which 85% were granted free of charge, for the benefit of the health of society.

Dr Oliver Cox
Heritage Engagement Fellow, Humanities
This is evident within the Consulting Services team, who support the University’s academic base in translating their expertise into impact.

Academics at Oxford can take up to 30 days each year to work with external organisations to provide insight and knowledge. Consulting Services cover numerous sectors putting this expertise into practice, such as using the University’s statistics base to put hard facts behind concepts and investigations, working across the energy world to bring Oxford knowledge to sustainability-driven projects, and providing expert witnesses in legal cases.

An example of the latter was highlighted in the 2019 BBC documentary, The Man Who Used HIV As A Weapon. Focused on the case of Daryll Rowe, who was accused of intentionally infecting five victims with HIV, Oxford academic Peter Simmonds was called in to examine the case. Through examining the genetic similarity of the HIV between the victim and the accused, Professor Simmonds found the two were linked, and was able to rule out other sources of transmission. Consulting Services supported Simmonds throughout the process.

The team works with academics to find similar positions relating to their work and manages all the associated contracts and paperwork. Effectively the literary agents of the academic world, Consulting Services can negotiate fees, search for opportunities, negotiate contractual agreements, and are on hand to support academics through every step of their consultancy, leaving them to continue with the work they are passionate about.

CLINICAL OUTCOMES

Oxford University Innovation’s Clinical Outcomes team, who manage the licensing and support of 30 high-quality clinical outcome assessments (COA) which track and support recovery from illness, had a stellar year; completing 756 licences during 2019, of which 85% were granted free of charge for the benefit of the health of society.

One significant deal that took place was in collaboration with NHS Digital to extend the delivery/licensing of two of our managed COAs to be available on the National Clinical Content Repository library within the UK. This enables both the Recovering Quality of Life measure (for mental health), or ReCoL, and the Versus Arthritis Musculoskeletal Health Questionnaire, or MSK-HQ, to be deployed in the NHS and social care setting throughout the UK.

Creating Impact

Despite the attention our spinouts get, licensing activities still remain the core source of income for OUI. Of the several hundred disclosures logged per year, OUI patents around one quarter of them. Of those, only a fraction go on to form new spinouts. The rest, we seek pre-existing companies to licence, develop and commercialise the intellectual property.

2019 saw a massive jump in the number of licences signed, increasing from 135 (where it has roughly been since 2016) to 188.

Some of these projects have been used to form the basis of our new Student Entrepreneur Programme (StEP), launched in conjunction with the Oxford Foundry and Oxford Sciences Innovation in 2019. A flagship programme for OUI’s Startup Incubator since its evolution in 2018, StEP offers students the chance to access OUI’s IP vault for ideas they could turn into companies. Once they have an idea, student teams receive a month’s worth of intensive entrepreneurship training and a £1,500 stipend to develop a new venture proposal. At the end of the period, OSI will invest in the winning team.

The first cohort featured 29 students spread over six teams, with the team working on a quantum random number generator picking up the winning prize of £25,000. Many of the six ideas are still being pursued by one or more of the original team. The initial trial of StEP was consequently deemed a success by all partners, and the programme will be returning in the next 12 months for two new cohorts.

Since the relaunch, the Incubator’s new approach of lower equity has proved incredibly popular, with over 100 applications in the past year. There have been four new incorporations and significant further investments into existing companies.

Externally, OUI has led on defining the Oxford Cluster for the first time. Drawing inspiration from JRR Tolkien who said “I wisely started with a map, before writing the stories of Middle Earth,” OUI has worked with a number of partners on creating the first map of our innovation ecosystem.

Available to everyone at oxfordcluster.com, the map not only shows all the resources in town available to entrepreneurs, but also has an interactive element which displays all the companies in the region. Whether you are potential biotech talent looking at prospective companies in the region, a journalist looking for the University’s AI companies, or an investor looking at Harwell’s space cluster, the map can be filtered and curated to provide the information you need.

The map is the first part of an effort to harmonise the Oxford Cluster with the goal of speaking with one voice about the numerous successes and advancements in the region. Over time, OUI will further support our cluster partners to create synergistic messaging, improve data sharing, and further develop a sense of community within the cluster.

We continue to support our innovation community through events, which have varied greatly in scale over the past 12 months. OUI has launched the Innovation Bash series of events – an informal open invitation event for everyone working within the innovation ecosystem. Formed with the purpose of celebrating the growing strength of the ecosystem, the format is simply casual networking, light entertainment in the form of a band, and free drinks. The Innovation Bash has been a great success, effectively selling out on its most recent iterations.
The Oxford Innovation Society (OIS) held one of its biggest ever meetings in June, bringing together 250 delegates to discuss data-driven healthcare on the theme of the road to NHS 2030. Extending beyond our regular evening session, the June OIS held an additional series of talks and seminars through the afternoon in Keble College. Over the coming year, OUI, working with University colleagues, plans to evolve the OIS so it can offer more to its members and provide greater benefit to a wider range of University stakeholders.

We also worked throughout the year on delivery of AI@Oxford, the University’s biggest ever tech event, held in September 2019. Focused on artificial intelligence, the event ran for two days across three streams: technology, healthcare and society. It attracted 700 delegates from around the world, giving our academics and spinout body the opportunity to meet and engage with delegates from all walks of life. The event succeeded in demonstrating the strength of Oxford in the field of AI to the world, securing major international coverage in outlets such as the BBC and Wall Street Journal.

StEP offers students the chance to access OUI’s IP vault for ideas they could turn into companies.
A life without sight is a reality many of us would struggle to even comprehend, let alone live with. Yet, for 285 million people, severe visual impairment is a reality, equating to roughly one in 26 people globally. 39 million of those are completely blind; of those, 90% live in the developing world.

The good news is that help is on the way. Oxford University, through its innovation activities, has launched three companies which are looking at novel ways of treating visual impairment. The most notable example of these is also one of Oxford University Innovation’s biggest successes to date.

Nightstar Therapeutics, founded in 2014, was created to develop research by Professor Robert MacLaren into gene therapies which could treat rare genetic retinal disorders. Since its creation, Nightstar has become a runaway success. Typically, a spinout’s development cycle can take as long as 10 years, particularly in life sciences. Nightstar went from spinout to Initial Public Offering (IPO) in four, holding its flotation on the NASDAQ in 2018. The company then went on to be sold to major US biotech Biogen in 2019 for more than $800m, one of the biggest UK biotech exits in recent history and a record exit for an Oxford University spinout. Its primary product is currently in Phase III trials, with the potential for deployment not far off.

Another spinout looking at this space from a different angle is OxSight, a company using AI vision technology to help enable sight.

The company’s technology is inspired by fundamental vision research, undertaken at Oxford’s Clinical Neuroscience Department, which focuses on how the brain construes visual information. OxSight smart glasses, powered by computer vision algorithms, stream a live feed into colour-rich, OLED displays which are placed directly in front of the area of usable vision. The technology, incorporated into both OxSight’s Prism and Crystal glasses, can expand the field of vision, enabling people with tunnel vision to see more of the world.
OxStem came out of the gate in 2016 with one of the biggest seed rounds in Oxford history, raising £16.9m. Acting as a parent organisation, it has created a number of smaller companies, known as Stems. These Stem spinouts are focused on unmet medical needs such as diabetes, chronic wound healing, and cancer.

One of these Stems, OxStem Ocular, is looking for small molecules that can regrow cells in the eye to treat blindness, and the team includes Robert MacLaren who founded Nightstar. OxStem Ocular’s approach differs as it does not require cell transplantation and has the potential to treat blindness regardless of the genes that cause it.

Oxford’s companies aren’t just helping people regain sight, but are also training artificial intelligence to detect diseases before a human doctor can. While OxStem Neuro and OxStem Cardio are looking at therapeutics that can treat victims of dementia and heart disease, the growing field of imaging diagnostics is providing clinicians real hope in preventative medicine that can tackle two of the biggest killers of our age.

As our society ages, the terrible disease of dementia has in 2019 become the UK’s number one killer. Dementia robs people not just of a sense, but of their entire identity. Tragically, it is a disease that cannot be cured at present, with over 100 failures to date for potential therapeutics.

Dementia is a very complex disease of the brain and this complexity is further exacerbated by the lack of new and improved drug treatments for patients as clinical trials continue to fail. Globally most clinicians use a variety of cognitive tests, MRI, PET and CT scans to gather vital information about the disease in order to move towards some hope of accurate diagnosis. If appropriate and deemed necessary, patients today will most likely be prescribed cholinesterase inhibitors and/or memantine. These older drugs are designed to address symptoms and do not tackle the underlying pathology of the disease and its progression towards severity.

Oxford Brain Diagnostics, a brain health analytics spinout, is looking to enable early detection of Alzheimer’s. Using MRI as the source, its proprietary algorithms measure...
neurodegeneration in the grey matter cell structures that can be a precursor to the disease years before the symptoms emerge. With this information, it may be possible to help pharmaceutical companies with much needed innovative new drugs and support a clinician’s diagnosis of patients with useful and relevant new data on the condition being assessed. With this combined effort, detecting the disease earlier and theoretically delaying its progression could lead to better patient and family outcomes.

“We have to continue to push the global brain health campaign and I would like us to be one of many key players at the forefront of enabling public awareness and education,” said Dr Steven Chance, CEO at OBD.

“By launching innovative new measurements and monitoring of brain health, we hope to empower clinicians and the patient voice, to demystify the brain and mental health issues, and to encourage access to scans for consistent health monitoring and for prevention of serious neurological conditions.”

Imaging diagnostics is also helping clinicians identify and respond to stroke victims at pace, thanks to Oxford spinout Brainomix. The company’s e-Stroke Suite software can automatically assess brain scans to support a physician when diagnosing stroke patients. It’s AI-driven software can generate advanced results from simple CT scans, allowing doctors to quantify the potential damage of a stroke, and in turn decide the best treatment option for each patient.

Having secured its first CE mark in 2015, the company has expanded its portfolio and now offers clinicians the world’s most comprehensive stroke imaging platform. As part of a recent collaboration with the University, Brainomix has become one of the technology providers of a £17.5m UK government funded project into AI-based imaging technologies. The company has continued its global expansion, with its software now being routinely used in hospitals and stroke centres around the world.

“At Brainomix we are committed to creating solutions that will benefit all levels of a stroke network, but in particular we are focused on advancing the value of simple imaging, to make life-saving stroke treatments accessible to all patients,” noted Dr. Michalis Papadakis, CEO and Co-Founder of Brainomix.

Despite dementia’s ascendancy to become the top killer in the UK, heart disease is still at second place, accounting for 10.9% of all deaths in 2017. The World Health Organisation estimates that 80% of all heart disease and strokes are preventable. As with any disease, the earlier at-risk patients can be identified, the more can be done to treat the condition.

Caristo Diagnostics, a spinout based on the pioneering work of Professor Charalambos Antoniades at the Radcliffe Department of Medicine, again makes use of CT scans and AI-driven imaging software, to spot potential heart attack victims.

Caristo’s technology is set to revolutionise our approach to predicting an individual’s risk of dying from a heart attack.

Cheerag Shirodaria, Caristo’s CEO

The technology is highly accurate, has generated evidence in thousands of patients and can identify the plaque build up that could lead to cardiac arrest years before the event happens.

“Caristo’s technology is set to revolutionise our approach to predicting an individual’s risk of dying from a heart attack” said Cheerag Shirodaria, Caristo’s CEO. “Our methods require no additional inconvenience for either patients or doctors and can even reclassify a patient’s risk from existing CT heart scans that have already been obtained. The company has generated considerable publicity through its scientific innovation and is poised to launch its service for patients in 2020.”

Brainomix e-ASPECTS uses deep learning algorithms and clinical engineering to enable quick and accurate assessment of ischemic stroke damage.
OUI ACHIEVEMENTS

Fundamental to the long-term success of any technology or idea that comes through OUI is to ensure strong, sustainable foundations for growth.

SPINOUTS CREATED: 19
TOTAL DEALS: 1002
DISCLOSURES: 367
PORTFOLIO VALUE: £164M
CONSULTING DEALS: 535
CONSULTANTS UTILISED: 338
REVENUES: £18.2M
RETURN TO RESEARCHERS: £9.2M
NIGHTSTAR EXIT: $877M
EXTERNAL INVESTMENT: £438.8M
SOCIAL ENTERPRISES: 2
PATENTS UNDER MANAGEMENT: 4312
LICENCES: 188
TRANSLATIONAL FUNDING AWARDED: £23.9M
PAN-UNIVERSITY BOARD APPOINTED
LAB10x LAUNCHED

OUI activities returned £9.2m to researchers and the University and £1.5m was returned to Oxford University through the gift aid covenant agreement.

Results for 2019 show consistent year on year performance in both Licencing & Ventures income and Consulting Services income.
Oxford University Innovation’s total revenue for the 12-month period from 1 August 2018 to 31 July 2019 totalled £18.2m.

In addition to the revenue of £18.2m, OUI received £5.6m from Oxford University for managing the Intellectual Property and Spinout Investment portfolio and associated services.

Results for 2019 show consistent year-on-year performance in both Licensing & Ventures income and Consulting Services income, with an increase to equity realisation income (boosted significantly from the Nightstar realisation in June 2019).

During the year, OUI activities returned £9.2m to researchers and the University, and £1.5m was returned to Oxford University through the gift aid covenant agreement. The 2019 profit will be part returned to Oxford University and part retained as reserves for investment in the 2020 financial year.
Fundamental to the long-term success of any technology or idea that comes through OUI is ensuring strong, sustainable foundations for growth. We look to achieve this by finding homes for our technology which provide an environment for exciting companies to grow, deploying the University’s depth of knowledge throughout the commercial sector, and through building companies with the potential to scale up rapidly, creating jobs and financial impact in the process.

Our spinout generation numbers for 2018/19 remain consistent with recent years, leading to 19 new companies. This has been matched with record levels of investment into our spinouts. Over 2018/19, we saw £439m invested into spinouts, £17.3m of which was at the seed stage. This funding is giving our spinouts an opportunity to accelerate which simply hasn’t existed to date in Oxford. To put this in context, and with a slightly different lens, our spinouts raised £547m over the 2018 calendar year. Overall, UK spinouts raised just under £1.5bn in venture funding for the same period, meaning that over a third of total UK spinout investment is coming into Oxford.

OSI, a crucial catalyst for the growth in spinout numbers and investment, confirms that spinouts in their portfolio are now employing over 750 people locally, and expect this number to rise significantly. With £150m currently deployed from the £600m fund they manage, OSI estimates continued growth in the spinout portfolio, and is aiming to have invested around £900m by 2025 which it thinks will be met with around £3bn of additional external investment.

With much of its portfolio focused on post-2015 companies, the job numbers OSI reports don’t account for many of our more established spinouts. Oxford Nanopore, our highest value spinout at present with a valuation of £1.6bn, employs over 450 alone.

Adaptimmune and other companies based at Milton Park, where over half the companies are spinouts, have become major employers in their own right, while many smaller spinouts still employ over 100 heads. OUI itself employs 78.

These are well paid jobs in high growth companies with substantial backing which are helping contribute to the Oxfordshire and national economy.

With regard to getting Oxford ideas out there, our 2019 deal flow reflects one of our most successful years to date. We signed 198 licence, option and materials sales deals this year, up 38% from last year and well over double where we were in 2015.

Our Clinical Outcomes team, responsible for managing COAs for Oxford and other institutions, granted 756 licences this year, 85% of which were granted free of charge. The remaining paid licenses brought in £780,000 – a year on year increase of 41%.

Over a third of total UK spinout investment is coming into Oxford.

Meanwhile, our Consulting Services arm signed 535 deals in 2018/19, outperforming results from every 12-month period since 2015. Bringing in just shy of £5m through their activities, Consulting Services was responsible for roughly 20% of OUI’s total income.

Our spinout portfolio is now worth £164m, up from £114.3m in 2016/17. This year saw our equity realisation hit £23.8m, up from £69,612 in 2017/18, driven largely by the exit of Nightstar Therapeutics.

Combined with our income from licensing and ventures, OUI was able to return £9.2m to researchers and departments in 2019 – a figure broadly in line with our performance over the past three years. We also spent £5.9m on safeguarding ideas and fostering their development, investing in the next generation of impact from Oxford.
We’ve also doubled down on the success of LAB282, the £13m drug discovery fund which has gone on to spawn a number of other ‘LABs’ around the world, with the creation and launch of LAB10x. Focused on emerging data-driven healthcare technologies, LAB10x is a partnership between the University, OSI, Evotec and Sensyne Health which will accelerate digital health concepts to the commercialisation stage, both directly providing clinical benefits and data that can be used to inform the development of new therapeutic strategies. The ideas LAB10x supports could profoundly transform the NHS and other healthcare providers while also creating companies that have economic impact.

Collectively, our work is bringing in money and opportunities for impact to the University, accelerating the pace at which Oxford ideas can develop, and ensuring those ideas have the best opportunity to not only have societal impact, but create jobs and wealth too.

Haematology specialist, Dr. Bethan Psaila, uses single-cell sequencing to identify potential targets for myelofibrosis, a severe bone marrow disorder.

VIEW MORE ONLINE

View our full annual review at:
annualreview.innovation.ox.ac.uk
Dawning in the 1970s, the Information Age has profoundly transformed human society. Thanks to advances in computing, the world is more productive, more connected, and more data-driven than ever before. The pace of progress has led many to wonder what comes next. The answer is that there are numerous technology fields competing to define the next century, and we’ll not truly know which wins it until the OUI Annual Review rolls round in 2100. However, there are several trends emerging which could well clinch it, and Oxford University, through OUI, is laying down the infrastructure for all of them.

THE AGE OF AUTOMATION

Oxford University boasts impressive credentials in the field of AI and automation, with both its Engineering and Computer Science departments ranked number one in the world by Times Higher Education in 2019. The University is home to some of the biggest names in the field, including Dr Alison Noble, Sir Nigel Shadbolt, Professor Michael Wooldridge and Professor Nick Bostrom.

The two departments are major contributors to the Oxford Boom, collectively providing the inspiration for over 40 of Oxford’s portfolio of spinout companies.

Perhaps one of the most notable is Oxbotica, the Oxford University spinout developing the software for autonomous vehicles. Founded by Oxford Robotics Institute academics Paul Newman and Ingmar Posner in 2014, the company has quickly become one of the most exciting prospects in the Oxford University spinout portfolio. Oxbotica has expanded rapidly and its constantly developing technology has been successfully deployed in challenging environments – and on all manner of vehicles - across Europe, Asia and North America, from bustling city traffic and airport runways to the harsh, unstructured landscapes of mines and quarries.

Oxbotica and Navtech, a global radar solution company, have announced their joint product development of a radar-based navigation and perception system to be launched in 2020.
The company is striving towards what it describes as “universal autonomy”, the ability to deploy autonomous vehicle software on any vehicle, in any environment, at any time. This approach makes Oxbotica’s technology exceptionally flexible and uniquely positioned to provide autonomy solutions for remarkably varied vehicle platforms and domains, both on- and off-road.

Potential benefits for the technology include improved safety, efficiencies, accessibility and environmental impact.

Since 2017, Oxbotica has led the DRIVEN consortium, a 30-month government-supported project committed to demonstrating the capabilities of a fleet of self-driving vehicles in complex urban environments across Oxford and London. The coalition of experts include Oxbotica, Oxford Robotics Institute, AXA XL, Nominet, Telefonica, TRL, RACE, Oxfordshire County Council (OCC) and Transport for London (TfL), who all came together in the autumn of this year to give a week-long demonstration around Queen Elizabeth Olympic Park in Stratford. The initiative confirms the rapid progress that has been made within the industry and further demonstrates the important role that connected and autonomous vehicles will play in the future of transport.

Latent Logic is another Oxford company operating in this space. The company is developing realistic simulations for automated vehicles that allow the underpinning AI to train at pace in a safe, virtual environment.

Latent Logic extracts real human behaviour from raw video data collected from traffic cameras, and trains its “virtual humans” to behave just like real humans do using a machine learning technology called Imitation Learning. The result is realistic virtual humans, providing automated vehicles with a simulated environment in which to train.

The company believes that not only would this allow for safer development of automated vehicles, but it would also be a critical enabler for autonomous vehicle certification and eventual large-scale public launches.

Latent Logic was acquired by Waymo, the autonomous vehicle division of Alphabet, while this report was going to press.

**THE QUANTUM AGE**

As our understanding of the world becomes increasingly reliant on big data sets, our ability to make sense of the data is hitting its limits. We’re frequently encountering intractable problems which take more time and power than classical computing can manage. To make the most of this data and achieve new breakthroughs, we’re going to need a new approach to computing.

Enter quantum computing. Potentially offering several thousand times the computational power of classical computing, the technology has obvious applications in fields such as machine learning and cybersecurity, the latter being pivotal in a quantum era as classical encryption wouldn’t stand a chance against a quantum hacker. Quantum also has a number of other applications: drug discovery and chemistry, aerospace and space exploration, finance, and secure communications to name a few.

As one of the propagators of early pioneering quantum computing research, Oxford University has long had a hand in the quantum space and is looking to capitalise on it as the technology matures. As the central point of the Networked Quantum Information Technologies (NQIT) Hub, a UK-wide alliance of universities working on quantum technologies, the University has become the de facto nexus for quantum research. It has also begun spinning out a number of companies both directly focused on developing quantum computers and the incidental technologies the race to quantum has uncovered.
OUI began forming quantum spinouts in 2017, kicking off with the launch of Oxford Quantum Circuits (OQC). Based on the work of Professor Peter Leek, the company is looking to develop superconducting electrical circuits, a scalable quantum component OQC are calling the Coaxmon. The company hopes the Coaxmon could lead to breakthroughs in a number of fields, including drug discovery and battery tech.

Quantum Motion Technology followed a couple of months after, taking a different approach to the quantum conundrum. The company is looking to keep quantum scalable and in silicon by seeking quantum computing architectures that are compatible with silicon processing. QMT’s main focus is on developing quantum enabled tech that keeps chip size the same as a stamp, not a stadium.

PQShield and Oxford HighQ joined the scene a year later, developing quantum cybersecurity and sensors based on quantum technology, respectively. Both are reflective of the incidental technologies developed as we pursue quantum, with many more anticipated as NQIT continues its work.

Rounding out the club is 2019’s addition, Oxford Ionics, which intends to build a fully functioning ion-trap quantum computer.

THE AGE OF SUSTAINABILITY

Also given the slightly more worrying moniker The Age of Reckoning, the coming 100 years are likely to be defined by climate change and implementing sustainability-led strategies to avoid decades of focus on rampant economic growth becoming undermined by underinvestment in wider society.

As with many other institutions, the University and its researchers are motivated by the data generated by climate scientists to develop solutions to help turn the tide on the environmental battle.

One key part to solving the climate challenge is how we interact with energy. As our energy demands increase globally, our need for clean power is growing exponentially. One spinout leading the field in this endeavour is Oxford PV.

The company is developing next-generation solar panels based on perovskite technology, capable of converting a much higher percentage of power from the sun compared to existing technology. Founded in 2010 based on the research of Professor Henry Snaith, Oxford PV has rapidly expanded to become a spinout with high potential for growth and impact.

In the past year, Oxford PV secured £65m in Series D funding to accelerate its manufacturing, including investment from leading photovoltaic supplier Meyer Burger. The company has since received its first two orders to produce its first solar lines, for 200 MW and 125 MW.

Another solution to our cleaner energy production is fusion energy. First Light Fusion is an Oxford spinout looking to make fusion power a reality.

Launched in 2011 based on the work of Professor Yiannis Ventikos and Dr Nicholas Hawker, the company aims to decarbonise the global energy system by developing a commercially viable fusion energy solution.

The company is deploying advanced implosion processes using intense shock waves to crush gas-filled cavities, inducing a collapse which it believes can concentrate energy. This creates an inertially confined plasma which First Light says is the key to affordable fusion energy. The company is currently working towards demonstrator fusion, which it aims to do in the near future.

In the meantime, Oxford Sustainable Fuels is looking at how we can turn the plastic crisis on its head. The company, based on the work of Dr Tiancun Xiao, Professor Peter Edwards and Dr Zhaoxi Zhang from the Department of Inorganic Chemistry, has cracked the process of turning unrecyclable and mixed plastics back into usable fuels.

While the process of turning plastics into pyrolysis oil has existed for a while, the end product does not have many practical applications. However, OSF can purify and upgrade pyrolysis into gasoline, diesel and kerosene, offering a practical use for our growing mountains of plastic waste.
As the Oxford Boom has continued to expand in recent years, OUI has continued to evolve its support to a changing Oxford and the wider world. In particular: offering support for a much broader range of projects across the whole university, and supporting sustainability.

In terms of research, Oxford University is one of the – if not the – broadest universities in the world. Stretching from the physical and life sciences which underpin many of the concepts that OUI works with to the 29 departments making up our social sciences and humanities divisions, the breadth and depth of research to work with is truly vast.

In a wider context, an emerging trend which looks to shape the next few decades is sustainability. A theme which touches all parts of society, adapting to a more sustainable future requires us not just to ask how we find balance between human activity and the natural world, but asks us to question the driving principles governing society.

In responding to both these challenges, OUI began offering its social enterprise offer in late 2018.

We at OUI believe that Oxford ideas truly have the potential to change the world. We also recognise that no two ideas are the same and require different types of support to thrive. More specifically, the spinout model which has made Oxford a world leader in generating companies based on physical and life sciences research may not be the right approach for developing social sciences and humanities concepts which look to put people before profit.

Offering our academics the opportunity to create social enterprises has opened up a healthy pipeline of gamechanging ideas, some of which have already been implemented in the past 12 months.
Our first social enterprise was sOPHi, a company based on the work of the Oxford Poverty and Humanity Institute (OPHI). Its core platform, the business Multidimensional Poverty Index (bMPI) is based on the OPHI’s multidimensional poverty fighting index developed by Professor Sabina Alkire. Initially developed for countries, sOPHi’s model allows companies to identify which policies are keeping employees in poverty and suggest alternatives which can help raise people out of it.

According to a report from the UN, 1.3 billion people around the world live in multidimensional poverty, many of these concentrated in Sub-Saharan Africa and South Asia. It is the goal of sOPHi to use the business MPI as a catalyst for helping achieve the UN’s Sustainable Development Goal One; ending poverty in all its dimensions.

The company provides businesses with the ability to measure and respond to poverty across their employees and their families, contractors, and in their supply chain. In addition, sOPHi plans to offer companies the ability to be audited to verify that they have met standards in implementing the bMPI and programs to impact the poverty of employees.

sOPHi began in its operations in Costa Rica with a pilot trial on a number of companies in the region. Partnering with Horizonte Positivo and the Costa Rican Government, the bMPI helped local bank BAC Credomatic identify that 12% of its employees were below the poverty line and design a programme to help them. sOPHi has plans to expand to a further 100 companies in Costa Rica and move into Columbia before expanding to Latin America and Africa in the coming months and years.

Closer to home, one of the starkest contrasts in Oxford, one of the most affluent cities and regions in the UK, is the high number of homeless people on our streets. An increasingly common sight in many towns and cities around the country, many individuals want to help those on the streets when and where they can. However, in an increasingly cashless society, people may not have the money at hand to donate. Further complicating potential donations is the concern that money may be used to fund habits that keep homeless people on the streets rather than financing avenues off them.
That’s where Greater Change comes in. The social enterprise has developed an app which allows people to provide secure, cashless donations to homeless people that they may meet on the street. Users can identify people they’d like to donate to through scrolling through a list or by scanning a QR code that the person will have on them. Once identified, the user can read the person’s story and see what they are saving up for – first deposit on a new flat, or perhaps new ID to help them back into the system.

These donations are co-managed between the beneficiary and local charity Aspire, which is committed to supporting local people who have fallen on hard times. The two work together to identify what is the most effective use of their donations and then craft a page for Greater Change. Once a funding target has been hit, the donations will be used to help that person off the street.

OUI is committed to not only helping ideas like sOPHiia and Greater Change develop sustainable business strategies, but finding funding to get the wheels turning. Through our crowdfunding platform OxReach, OUI has helped support five ideas to find the initial funding to make their concepts viable, raising a total £247,560 to do so. Most recently, we helped the Smart Handpumps project, which is installing smart water handpumps in Africa.

At present, 275 million people don’t have access to a reliable water supply. When the handpumps break, a common occurrence, local residents can be without water for up to a month, maybe more. One of the key issues in fixing the pumps in a timely manner is communication of the fault. An Oxford team, led by Patrick Thompson has begun installing smart handpumps with mobile technology which lets a locally based engineering team know there’s a problem.

Initial trials in Kenya have brought the waiting time for a fix down to three days. With the £50,000 raised through OxReach, the team are now able to run a more ambitious rollout of the pumps. The concept is also in the process of being turned into a social enterprise.

OUI is also actively seeding social enterprise ideas through its SE2020 social impact fund. We raised £550,000 for the fund, which is already in use to support our developing social enterprise portfolio. OUI is also leading discussions with a number of universities in the Midlands on a potential fund that will be able to support social enterprises of all shapes and sizes between here, Birmingham and Cambridge. The fund is due to launch in the next 12 months.