Amorim Nandi Exscientia TVG

news from the frontier

February 2021

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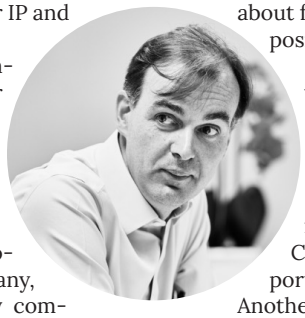
FUNDING PACE TO STEP UP AS PORTFOLIO MATURES

Welcome to the second edition of the quarterly newsletter intended to keep you up to date with all the latest development across Frontier IP and our portfolio companies.



In the last edition, I talked about a number of our companies approaching their inflection points. These are points marking significant and favourable change for a company whether through industrial traction or financial via funding rounds or an IPO.

We continue to see strong progress towards those goals. One portfolio company, Elute Intelligence Holdings successfully completed its first equity funding round in the New Year, raising £250,000 to accelerate development of its novel technology to make complex searches of unstructured data more simple. Several other portfolio companies are now in active discussions with investors about funding, so you can expect to see further positive news as 2021 unfolds.

One consequence of this increased activity is the need to strengthen our team and those of our portfolio companies. I am delighted to welcome Darren Winter as Director of Corporate Relationships to support our efforts. He has more than 30 years' experience in the City at senior levels in equity sales. On the portfolio front, we are currently recruiting.

Another consequence is the impact on our results. We'll have more to say in March when we report figures for the first half year to 31 December.

Neil Crabb, Chief Executive Officer, Frontier IP

CAMBRIDGE RAMAN IMAGING IN €5m EUROPEAN PROJECT TO REVOLUTIONISE MEDICAL IMAGING

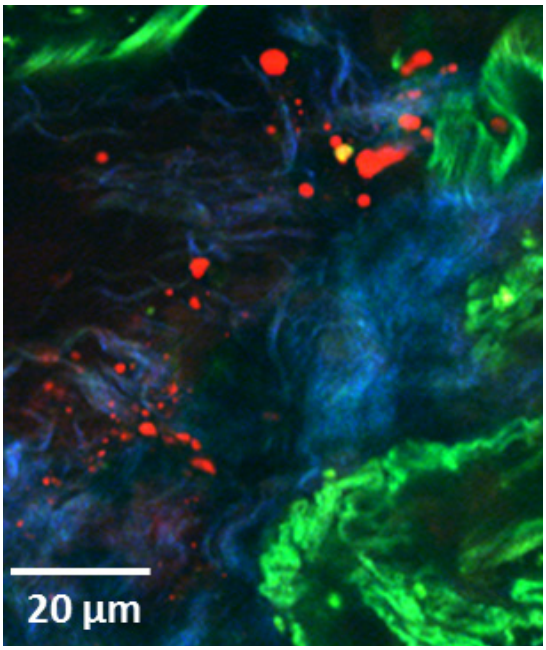
Cambridge Raman Imaging is part of a major €5 million project, called Crimson, aiming to develop breakthrough technologies in medical digital imaging.

The company is one of a 10-strong consortium from across Europe aiming to provide a deeper understanding of the cellular origins of disease. It will be able to work much faster and accurately than existing technologies, without the need for chemicals and dyes.

The technology combines advanced laser techniques and artificial intelligence to show how diseases unfold in near real time. Partners include the Politecnico di Milano, the Leibniz Institute of Photonic Technology, and the Centre National de la Recherche Scientifique.

Cambridge Raman Imaging is a spin out resulting from a partnership between the University of Cambridge and the Politecnico di Milano. It is developing advanced graphene-based lasers and sensors for use in spectroscopy and endoscopy. Frontier IP holds a 25.8 per cent equity stake in the company

The company raised £250,000 from private investors last year. It has also received a €140,000 grant from the European Graphene Flagship, and is collaborating with Motic on commercialising its technology.



EXPERIENCED CITY DIRECTOR JOINS FRONTIER IP

Darren Winter, a former senior sales director with more than 30 years' experience in the City, has joined Frontier IP as Director of Corporate Relationships.

Darren has been appointed to support portfolio companies with their funding requirements. His previous experience includes sales director roles with BWD Securities, Charterhouse Securities and HSBC. He was Head of Capital Markets, Sales, at Collins Stewart Wealth Management and has held roles at Westhouse Group and Arbuthnot Securities.

His appointment reflects the increased need for new equity to support portfolio companies as they mature.

CHEERS! TECHNOLOGY SPELLS END TO MAJOR CAUSE OF CORK TAINT IN WINE

The world's leading producer of cork products, Corticeira Amorim, has announced it can now remove the main cause of cork taint in wine from natural corks using technology invented by Professor Orlando Teodoro of Frontier IP's partner university NOVA University, NOVA School of Science and Technology (FCT NOVA).

The technology, branded Naturity by Amorim, removes volatile compounds from natural corks, including 2,4,6 trichloroanisole (TCA), the leading cause of the unpalatable flavours in wine associated with cork taint. Naturity is based on a process that combines temperature water and pressure without affecting the cork's properties and integrity.

Frontier IP supported FCT NOVA in engaging with Amorim to commercialise the new technology. Its role included negotiating the terms of the commercial agreement, including the licensing terms.

Under the terms of the partnership, Frontier IP receives an equity stake in companies created by FCT NOVA as well as a share of licensing revenue generated. So far three spin out companies have been created: AquaInSilico, Des Solutio and NTPE.

Amorim enjoys annual sales of more than €780 million and exports to more than 100 countries.

ELUTE INTELLIGENCE'S FIRST EQUITY FUNDING ROUND RAISES £250,000

Elute Intelligence Holdings has raised £250,000 through its first equity funding round.

The investment made by private investors in return for a 10 per cent stake, values the company at £2.5 million post money and Frontier IP's holding of 41 per cent at £1.0 million.

The proceeds from the fundraising will be used to support Elute's recently launched Patent Reader and development of an enterprise search tool, based on the same underlying technology.

This uses forensic linguistics, which mimics the way people read to simplify complex searches through unstructured document datasets.

The approach is very different to conventional keyword or Boolean searches that require users to constantly enter new search terms. With Elute's technology, they can use any text as the basis for a search, including whole documents, to identify the most relevant information within a library, whether it is a collection of patents or unstructured enterprise documents.

The company was incorporated in 2019 from an existing business CFL Software and included complementary intellectual property from Frontier IP. Existing customers include UCAS, which is using a version of the technology called Copycatch to detect plagiarism in students' personal statements.

Richard Nugent, Head of IP Strategy for Coller IP will be demonstrating the Patent Reader and its applicability to freedom to operate searches at a webinar on 24 February, 15.30 GMT or 16.30 CET. For more information head to eluteintelligence.com/registration.

FIELDWORK ROBOTICS GAINS GRANT FROM SUSTAINABLE INNOVATION FUND

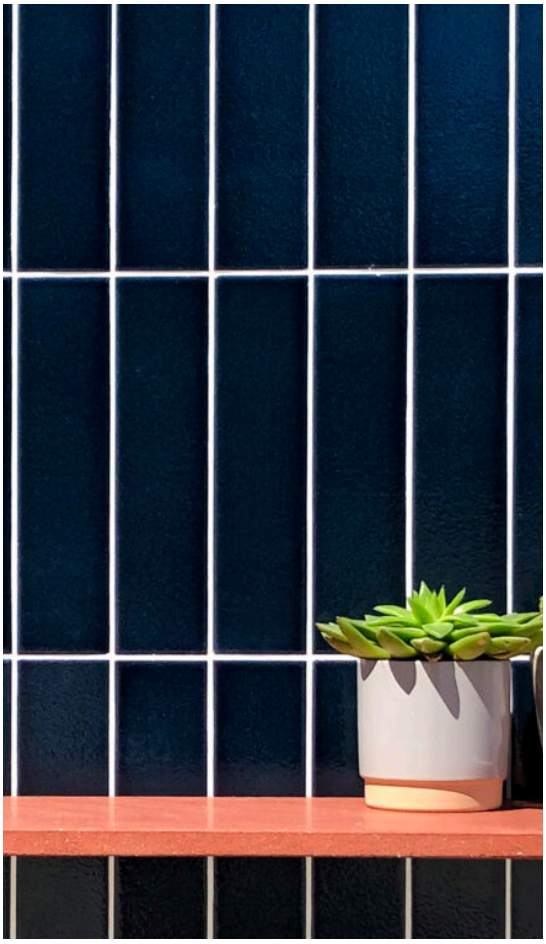
Fieldwork Robotics has created a digital simulator of its robotics technology to allow engineers to work remotely during lockdown and optimise internal processes to reduce prototyping costs.

The development was funded by a £145,000 grant from the Sustainable Innovation Fund, administered by Innovate UK. The grant was supplemented by a further £30,000 from Fieldwork as part of the company's moves to mitigate the impact of COVID-19.

The move marks a deepening with its industry partner Bosch, which is supporting the company on simulator development. An alpha prototype for manufacturability of its raspberry harvesting robot is expected for trials later this year.

Despite the challenges from COVID-19, the company has made strong progress over the past year. Developments included the successful completion of a third set of field trials with an earlier iteration of the robot. It also announced of a three-year partnership with Bonduelle to develop a cauliflower harvesting robot, a further sign of the growing commercial traction and maturity of its innovative technology.

Cambridge-based Fieldwork raised £318000 through an initial equity funding round last year, having previously been grant funded.



ALUSID'S COVID BACKING

Alusid has raised £250,000 via a convertible loan, including a £125,000 investment from the UK government's Future Fund.

The funding is being used to accelerate and development of the company's patented technology to create beautiful premium-quality tiles and other surfaces from recycled industrial waste. It has successfully demonstrated the technology can be scaled up for mass production.

The government's funding was matched by £125,000 from Frontier IP and £25,000 from a private investor. Frontier IP holds a 35.6 per cent equity stake in the company. The Future Fund was established to support innovative businesses affected by the COVID-19 pandemic.

THE VACCINE GROUP: NOVEL APPROACHES TO SARS-COV-2

The Vaccine Group (TVG) is developing vaccines initially for use in animals to tackle Sars-Cov-2, the virus causing COVID-19. As most diseases that afflict humans originally arise in other animals, the company believes it is sensible to tackle them at source in the reservoirs of infection.

There is also considerable value in developing animal vaccines because of tbe economic damage caused by diseases, such as bovine tuberculosis, even if they do not jump into humans.

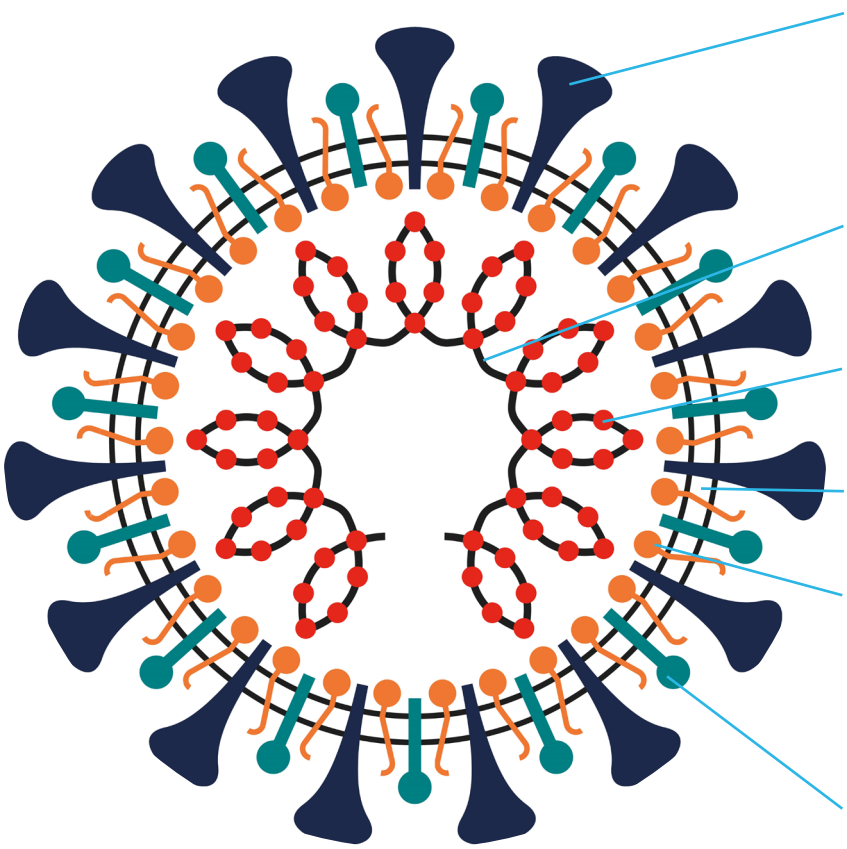
Sars-Cov-2, for example, originally arose in bats and entered human populations via an as yet unidentified intermediary species. COVID-19 has also been found in cats, dogs, ferrets and mink.

Longer term, there is potential for TVG to develop a vaccine for use in humans: Oxford University says there will be a need for second-generation vaccines because of the danger from virus mutations reducing the efficacy of those currently being deployed.

TVG's technology takes a fundamentally different approach to attacking the virus than other vaccines under development. To understand how, it is necessary to understand the structure of the virus and how it has mutated to date.

Bats are a major reservoir of zoonotic diseases, such as COVID-19

INSIDE SARS-COV-2, THE VIRUS THAT CAUSES COVID-19



Spike protein	The distinctive crown-like protrusions which give all coronaviruses their name. The spike proteins act as hooks to attach the virus to a host cell and open it up for infection.
RNA genome	The heart of the virus. The RNA genome enables protein manufacture for other parts of the virus.
Nucleocapsid protein	Bound to the RNA string, the nucleocapsid proteins give the virus its structure and helps it to replicate.
Lipid membrane	Protects the virus outside a host cell. Anchors the proteins needed to infect cells.
Membrane protein	Membrane proteins fulfill several functions. They include moving molecules in and out of the virus and relaying messages between its external and internal environments.
Envelope protein	Helps the assembly of new virus particles once it is embedded in a host cell.

Sars-Cov-2 infects people via its spike proteins. These latch on to a protein, called ACE 2, found on cells in alveoli and other parts of the body. The alveoli are where the lungs and blood exchange oxygen from the air and carbon dioxide in the process of breathing in and out. The spike protein forces an entry into a cell by cracking it open using the interaction with the ACE 2 protein.

It is estimated there are currently more than 180 Sars-Cov-2 vaccines under development. Most are targeting the spike proteins: they aim to train the body's natural defences to recognise the spike protein and destroy the virus in the body. The concerns around the emergence of the Kent, Brazil and South African Sars-Cov-2 variants, all resulting from spike protein mutations, highlight two issues. First, the spike protein mutates more often than other proteins in the virus, perhaps because it is the contact point between the virus and host. Second, because it is the main contact point between the virus and host, mutations able to avoid or overcome the body's defences, whether natural or induced by a vaccine, mean a variant virus is likely to gain ground more rapidly.

TVG's vaccine candidates are targeting the nucleocapsid and membrane proteins, both essential to the virus's structure (see above). These proteins are building blocks necessary for the constructing the virus's core and surface, and are created earlier than spike proteins as the virus reproduces itself — meaning a vaccine that targets them can eradicate the virus sooner. Because these proteins potentially mutate more slowly, such vaccines could also be effective for longer.

Development to date

TVG has undertaken initial animal trials with three of six current vaccine candidates. TVG is now analysing the data from these trials, with the other three about to be tested. The company continues to make good progress with animal vaccines for Ebola, Lassa fever and other diseases causing human or economic harm, including bovine tuberculosis.

"ALL DRUGS WILL BE DESIGNED BY AI BY THE DECADE'S END" — EXSCIENTIA CHIEF EXECUTIVE ANDREW HOPKINS

Drug discovery driven by artificial intelligence (AI) is now at a "tipping point" and all drugs will be designed by AI by the end of this decade, according to Exscientia chief executive Professor Andrew Hopkins.

In an interview with the Daily Telegraph, Hopkins said computers and algorithms were now powerful enough to navigate and direct the complexities of human biological systems.

Exscientia is a world leader in AI-driven drug discovery. In partnership with Sumitomo Dainippon Pharma, it is the first company in the world to have an AI-designed drug enter human clinical trials, cutting the time to do so from the usual five years to 12 months. Professor Hopkins expected a second drug to enter trials shortly.

The increasing recognition reflects busy times for Exscientia, which has enjoyed a year of accelerated growth. It has completed a $70 million Series C funding round million led by Novo Holdings. It has also taken significant steps to strengthen its management team.

Since September, the company has appointed a new chairman, David Nicholson, chief technology officer, Garry Pairaudeau, executive vice president of strategic alliances Richard Law, and a new chief financial officer, David Taylor. He is a former president and CFO of NASDAQ-listed oncology group Tyme Technologies.

The company has also announced a partnership with brain disorders specialist Blue Oak Pharmaceutical and a $4.2 million grant from the Bill & Melinda Gates Foundation. The company's existing partners include Bristol Myers Squibb, Bayer, Evotec, GT Apeiron, Rallybio and Sanofi. Frontier IP holds a 2.4 per cent equity stake in the company.

Exscientia chief executive Professor Andrew Hopkins

GLUTEN-FREE INGREDIENTS GAIN NANDI A SLICE OF THE ACTION

AB Mauri, a subsidiary of one of the world's biggest food companies Associated British Foods, is testing Nandi Proteins' novel ingredients in its gluten-free bread recipes.

The move is the next step in the scale up and commercialisation of the technology. Development started two years ago when a Nandi-led consortium, including AB Mauri, won a £250,000 grant from Innovate UK and Coeliac UK to improve the taste and texture of gluten-free bread.

Nandi's ingredients are based on proteins found in faba beans, oats and rapeseed cake, a by-product of rapeseed oil production. They are intended to be a better alternative to the eggs and gums currently used to replace gluten in bread.

Other members of the consortium include Origin Enterprises, part of Agrii.

Nandi is also working with Devro to scale up its collagen-based fat replacements for sausages and other processed meats.

PULSIV SOLAR GAINS NEW CHINESE PATENT

Pulsiv Solar has been granted a further patent in China for its technology to improve the energy efficiency of power converters.

The company now has nine patent families in prosecution, five of which have granted in at least one territory.

It has 18 granted national patents in USA, Europe, Australia, Taiwan, Mexico, Japan and China, counting the European Patent Office as a single grant.

TVG TO TARGET PIG DISEASE IN PIRBRIGHT TIE UP

The Vaccine Group (TVG) has entered into collaboration with The Pirbright Institute and ECO Animal Health to tackle one of the economically damaging diseases to the global pig industry.

The collaboration will see TVG use its novel vaccine technology to combat porcine respiratory and reproductive syndrome virus (PRRVS), which is estimated to cost pig farmers €1.5 billion in Europe and those in the US $600 million each year.

Under the agreement, ECO will fund the 18 month project to develop two prototype vaccines. Pirbright, a world leader in controlling zoonotic and livestock viruses, will supply the PRRVS genes and conduct animal trials.

TVG is also developing vaccines for COVID-19, African Swine Fever, Ebola, Lassa fever and bovine tuberculosis. Its COVID-19 work is set out elsewhere in this newsletter.