

**CORPORATE**

 Current price **65.5p**

 Sector **Support Services**

 Code **(FIPP.L)**

 Listing **AIM**
**SHARE PERFORMANCE**


Source: Thomson Reuters, Allenby Capital

**SHARE DATA**

 Market cap (£) **25.1m**

 Shares in issue (m) **38.28**

52 weeks	High	Low
	<b>94p</b>	<b>50p</b>

 Financial year end **30 June**

Source: Company Data, Allenby Capital

**KEY SHAREHOLDERS**

Hargreave Hale	18.86%
Miton Group	15.26%
Quilter	9.75%
Axa Investment Management	8.23%
Neil Crabb	7.40%
Legal & General IM	6.53%
WB Nominees	3.18%

Source: Thomson Reuters

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**FRONTIER IP GROUP PLC (FIPP.L)**
**The art of successful technology transfer**

Frontier's business model differs in fundamentally important respects to other IP commercialisation specialists. It operates a low cost, capital efficient model where Frontier receives free equity in the spin-out company in return for its strategic support on the spin-out's path to commercialisation. Frontier has equity holdings in 15 core companies at various stages of IP commercialisation including two incorporated from the University of Cambridge Graphene Centre, details of which have yet to be disclosed. This initiation research note provides a description of the Frontier business model, an analysis of the core spin-out companies announced to date and Frontier's value proposition which will continue to strengthen as its portfolio companies mature and successfully commercialise their IP. We consider that the current fair value, as stated in the accounts, undervalues the embedded quality of the respective IP and the commercial potential of the underlying businesses. In addition, we believe that forthcoming equity realisation events will show a significant uplift in valuation. In November 2018, the balance sheet was strengthened by an oversubscribed placing which raised £2.49m gross for the Company.

- **Portfolio companies at varying stages of IP commercialisation** – The Group's holdings are primarily in seed, start-up and early stage companies. Frontier receives founder equity in the spin-out company for a nominal consideration and at the point when the spin-out company is incorporated, Frontier initially values the company at a notional £50,000. When IP is assigned from the University to the spin-out the valuation will be set between £100,000 and £1m. Thereafter, the company is valued by reference to IPEV Guidelines including the pricing of the latest round of funding. Frontier may, but is not obliged, to participate in funding rounds.
- **Substantial minority stakes** – Frontier's founder equity holdings are generally determined through negotiation with other stakeholders but will tend to range from 15-20% to a current maximum of 40%. Equally, while equity stakes tend to be diluted from non-participation in funding rounds, so their equity value increases as the IP becomes more valuable.
- **NAV rising progressively** - Frontier's reported Net Asset Value (NAV) of £12.7m as at 30 June 2018, has risen consistently over the past several years as the aggregate valuation of its portfolio increases as new funding rounds are completed and new spin-out companies are added. However, we believe the reported NAV to be fundamentally understated as the core portfolio will have a significant element of spin-outs that are still only notionally valued in the accounts as they have yet to initiate their first funding rounds.
- **More than the sum of its parts** - The intrinsic worth of these notionally-valued companies bears no relationship to the potential value of the IP and the companies themselves. We would also argue that the value of companies that have completed funding rounds is understated given the strategic progress made since completion of the funding. Thus, it is our belief that the sum of the parts is substantially higher than the stated fair value of the portfolio and Group NAV.

**EXHIBIT 1: SUMMARY OF FINANCIALS**

Year End: June (£000)	2015A	2016A	2017A	2018A
<b>REVENUE</b>	1,591	2,030	2,309	2,363
<b>PBT REPORTED</b>	647	1,131	1,229	902
<b>EPS (p) (REPORTED)</b>	2.76	4.08	3.73	2.36
<b>NET CASH/(DEBT)</b>	636	771	2,329	1,111
<b>NAV PER SHARE (p)</b>	20.9	24.9	30.7	33.2

Source: Frontier IP Group plc

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## INVESTMENT SUMMARY

- **Most IP commercialisation companies have seen a reduction in their share prices** – Of the seven UK-quoted IP commercialisation companies, **Allied Minds; Arix Bioscience; Mercia Technologies; NetScientific** and **Tekcapital** are all lower than they were a day after listing. The only companies to show an increase have been **IP Group** and **Frontier IP**.
- **A fundamentally different business model to peer companies** – Frontier's business model is fundamentally different from its peers. It does not use cash to acquire equity stakes in the resultant spin-outs but rather it receives founder equity in return for its highly experienced hands-on support and advice throughout the IP commercialisation process. The result is a low-cost, highly capital efficient model significantly reducing the potential for shareholder dilution which would otherwise occur through constant fund raising to support the funding rounds of portfolio companies.
- **Close relationships with universities in the UK and Portugal** - Frontier has established formal and informal relationships with sources of exploitable IP, primarily with universities including Cambridge and Plymouth in England and two universities in Portugal. Formal relationships with its Portuguese universities have been enhanced through a partnership signed with the UK's Department for International Trade for the British Embassy in Lisbon to provide strategic support to Frontier.
- **Execution risk substantially mitigated** - By their nature university spin-out companies are very early stage businesses and consequently carry a higher level of execution risk as regards the successful commercialisation of their IP. However, this risk is partially mitigated through the extensive due diligence undertaken by the Frontier team and also through the portfolio approach to holdings which dilutes the impact of any particular company failing to achieve its assumed potential. In addition, it is important to note that many spin-outs benefit from continuing non-dilutive investment by the university itself.
- **Portfolio conservatively valued** - One of Frontier's most compelling investment propositions is that spin-out companies are, in our opinion, conservatively valued in its accounts. Those spin-outs that are still waiting for the assignment of IP are based on a company valuation of just £50,000. Those that have had the IP assigned from the university are notionally valued at between £100,000 and £1m and on fund raising events Frontier's stake is then valued by reference to the price of the last funding round. Frontier has the opportunity to participate in funding rounds but is not obliged to do so.
- **Mix of companies at varying stages of maturity** – By the nature of its business model, Frontier's core portfolio companies are at varying stages of IP commercialisation and there is a steady introduction of new spin-outs. This provides for an attractive balance of commercialisation maturities which at 14 November 2018 included 5 companies that have initiated a funding round/s and 10 (including two that have yet to be announced) that have had the IP assigned to them but have yet to raise money or that still await the assignment of IP.

## THE NEED TO COMMERCIALISE UNIVERSITY IP

**Exclusive right to commercialise university IP taken away from government...**

In 1985, the UK government announced that the British Technology Group (BTG) (formerly the National Research Development Corporation) would no longer have the exclusive right to commercialise inventions deriving from university research and resulting from Research Council funding.

**...and opened up to universities and industry in 1985**

Since then academics and universities have been active in commercialising their IP to the extent that during 2015/16 there were over 13,500 new and existing spin-out and start-up companies active, employing over 44,000 people.<sup>1</sup>

**University IP now monetised by licencing technology or through spin-out companies which are often aided by IP commercialisation specialists**

There are several conduits through which universities are able to monetise the intellectual property derived from its academics and research teams, but two of the most popular are through licensing the technology to external companies or through spinning-out new companies to develop and exploit the IP. Specialist IP commercialisation companies such as Frontier IP form an important part of securing and establishing spin-outs, providing support and access to capital in return for equity stakes.

**University funding through grants, VC Funds and some IP commercialisation companies**

While there are various funding options open to universities to fund start-ups including funding through government agencies (see below) we believe that a meaningful element of funding, certainly at the latter stages of initial commercialisation, is derived through the specialist IP commercialisation companies and VC funds.

**EXHIBIT 2: NUMBER OF SPIN-OUTS AND AMOUNT OF EXTERNAL INVESTMENT RAISED (2005-2015)**



Source: Higher Education Statistics Agency (BESA); Higher Education – Business and Community Interaction Survey (HEBCI)

<sup>1</sup> HESCI data

**Studies have shown a decline in the number of spin-outs but an improvement in quality**

Exhibit 2 above illustrates that the number of university spin-outs has been falling since reaching a peak in 2010 but the amount of external investment raised in these spin-outs has been increasing over recent years. This may indicate that there has been more focus on the spin-outs that were likely to succeed.

Most universities now have their own Transfer Technology Offices that are responsible for facilitating the process of bringing research to market, often acting as a channel between academia and industry. Frontier's interactions with universities are typically conducted through the respective university TTO as well as direct with the academics. A recent report for the government by RSM PACEC Ltd<sup>2</sup> concluded that current approaches taken to commercialising university IP were working reasonably well and that the steps taken by participants have improved outcomes over time.

**Lack of resources and skills mean that some IP is still not being exploited**

The report nonetheless highlighted a number of specific constraints and barriers meaning there is potentially scope to do more. Within universities, a number of surveys have indicated that a lack of resources and skills mean that at least some potentially valuable commercialisation opportunities are not currently being exploited.

**Government initiatives**

In 2014 the government set up the Research Excellence Framework (REF) as a system for assessing the quality of research in publicly funded UK higher education institutions (HEI). The results demonstrated the high quality and enhanced international standing of research conducted in UK HEIs.

Nevertheless, a recent report by Anderson Law<sup>3</sup> suggested that research funding is facing a crossroads. It stated *"Uncertainty over Brexit has left the future of many funding streams far from secure. At the same time, the seven research councils, Innovate UK and Research England are merging into UK Research and Innovation (UKRI). With this, UK universities' ability to turn research into innovation is once again under the spotlight"*.

**KEF to benchmark how well universities exploit their assets**

To address this and other concerns, the government recently asked the UKRI to develop a new Knowledge Exchange Framework (KEF) which will benchmark how well universities exploit their assets and capabilities for the benefit of the economy and society, but also to ensure fair comparison, recognising there is no 'one size fits all' approach to knowledge exchange.

The government already offers several support and funding mechanisms designed to encourage and facilitate universities to commercialise IP. These include but are not limited to: Higher Education Innovation Funding (HEIF); Innovate UK, Impact Accelerator Accounts, Research Council Follow-On Funds, Enterprise Capital Funds and the business Angel Co-fund which invests alongside syndicates of business angels. Nevertheless, 90% of university and 41% of spin-out company respondents highlighted the difficulty of finding appropriate funding at the earliest stages of commercialisation.

In June 2018, as one of the key outcomes of the Patient Capital Review, the government announced a new £2.5 billion Investment Fund (British Patient Capital) to be incubated within the British Business Bank, doubling the annual allowance for people investing in knowledge-intensive companies through the Enterprise Investment Scheme (EIS), and also doubling the annual investment those companies can receive through EIS and the Venture Capital Trust (VCT) schemes.

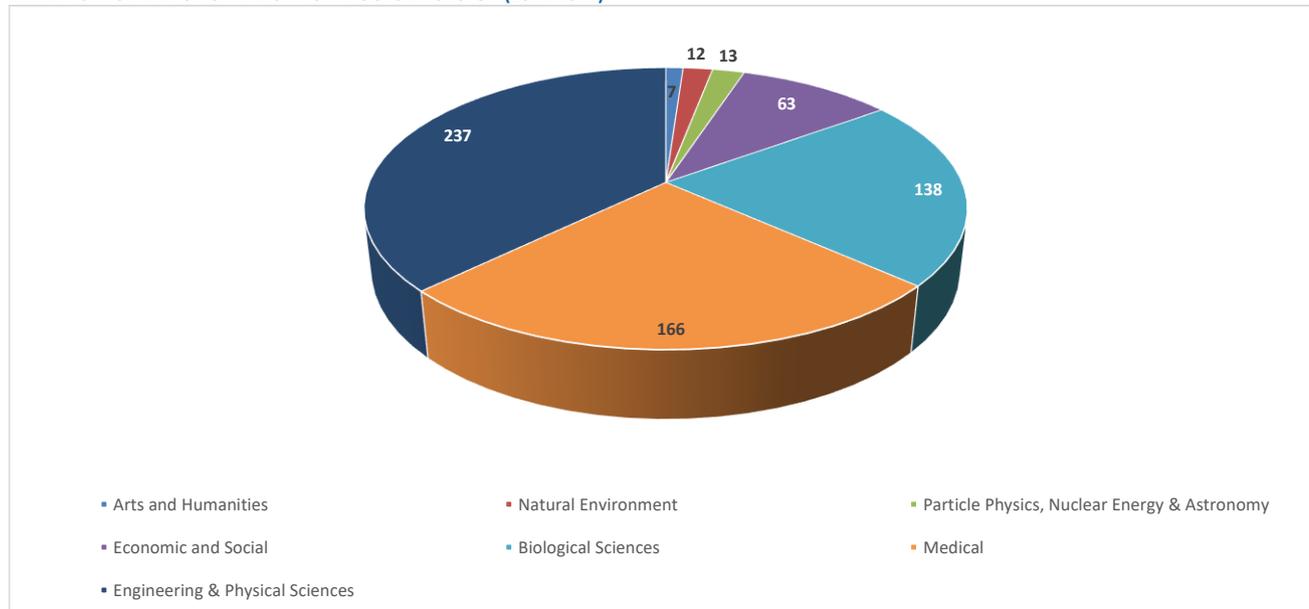
<sup>2</sup> "Research into issues around the commercialisation of university IP" (A Report for the Department for Business, Energy and Industrial Strategy by RSM Pacec Ltd).

<sup>3</sup> April 2018 - "University Spin-Outs – an imperfect ecosystem"

**Spin-outs shown as thriving**

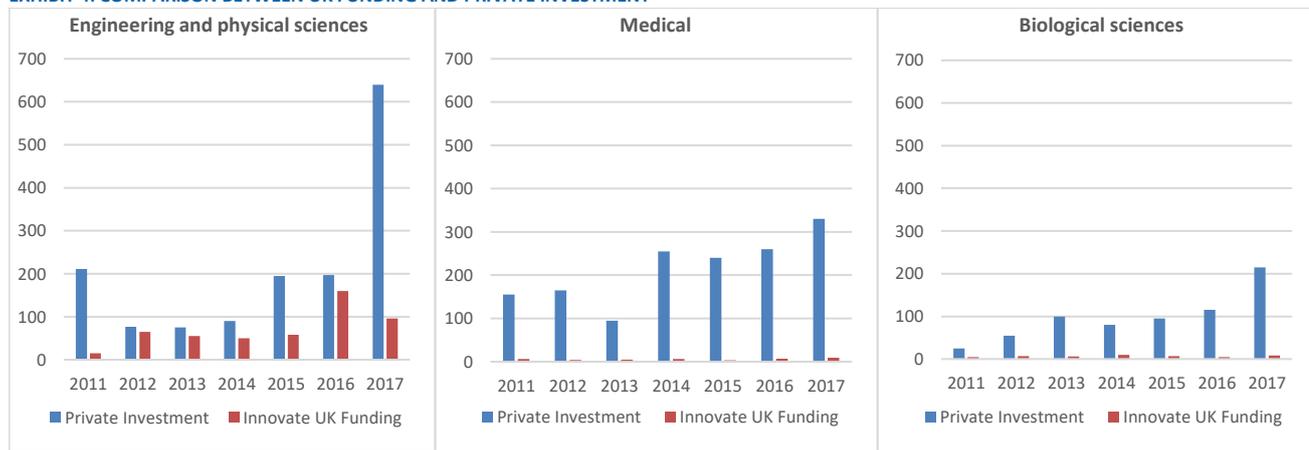
The Anderson Law report referred to above, concludes that its findings are proof that spin-outs from UK universities are thriving. Nine out of ten spinouts which have received private investment between 2011 and 2015 have survived. This is a high rate of success. When looking at start-ups overall, only two in ten survive beyond their fifth year.

**EXHIBIT 3: NUMBER OF UNIVERSITY SPIN-OUTS BY SECTOR (2011-2017)**



Source: Anderson Law report

**EXHIBIT 4: COMPARISON BETWEEN UK FUNDING AND PRIVATE INVESTMENT**



Source: Anderson Law report

The three sectors above (Exhibit 4) represent those attracting the highest level of funding. Particle Physics, Economic & Social, Arts & Humanities and Natural Environment attract much lower levels of investment. However, in all cases private investment (private equity or venture capital) is substantially higher than UK government funding.

## AN OVERVIEW OF FRONTIER'S BUSINESS MODEL

Frontier's business model is to assist universities in the commercialisation of their research in return for founder equity...

... through formal and informal relationships

Frontier becomes involved in the early stages of inventions and then forms an integral part of the screening and validation process of the IP

### STRONG RELATIONSHIP WITH UNIVERSITIES AND RESEARCH ORGANISATIONS

UK universities are among the best in the world with Oxford, Cambridge, UCL and Imperial all regularly making it into the QS top ten rankings.<sup>4</sup> Frontier's business model is to assist universities and research organisations in the commercialisation of the IP arising from their research. In return, Frontier seeks to share in the founder equity and licence revenue that these companies receive from the commercialisation of their research.

To develop a regular flow of new spin-out companies, Frontier has established both formal and informal relationships with a number of universities in the UK and overseas and it believes that there is no shortage of opportunities, rather it has an excess of supply. This in turn maintains a high level of deal quality and pricing.

In practical terms, in formal relationships with universities such as Plymouth and Universidade NOVA de Lisboa Faculty of science and Technology (FCT), Frontier sees prospects at invention disclosure stage, when the academics first tell the Technology Transfer Office (TTO) that they think they have IP with potential. Frontier then forms an integral part of the screening process looking at whether the academic/university is right and if so whether a spinout or licensing option is the right route. Where appropriate Frontier will seek informal industry feedback.

Frontier would receive either equity or licence revenue, depending on the route but there are numerous instances where it has informed a "decline to proceed" with the university partner. With informal partnerships, deal flow is generated through networking with the faculty and individual academics. Taking potential prospects forward will depend on industry validation of the IP, whether or not Frontier can add value to the proposition and the agreement of appropriate commercial terms.

### UK

**University of Plymouth** - In 2011, Frontier entered into a formal 10-year IP commercialisation agreement with the University of Plymouth with a mutual option to extend the agreement for a further 10 years. To date, this collaboration has resulted in the spin-out of **Porexper** in 2012, **Pulsiv Solar** in 2013, **Fieldwork Robotics** in 2016, **The Vaccine Group** and **Molendotech** in 2017 and **Amprologix** in 2018. Under the agreement Frontier will support the university as and when appropriate in a) assessment of IP pipeline activity, b) advice and guidance on the appropriate mechanism for commercialisation and c) market assessment.

**University of Cambridge** - Frontier has an informal but close relationship with the university's TTO (Cambridge Enterprise) and with individual academics (who, unlike other universities, do not necessarily have to work with the TTO to commercialise their IP). Nevertheless, this informal arrangement has spawned a number of spin-outs including **Cambridge Simulation Solutions** in 2014, **Tarsis Technology** in 2016. Two further companies comprising the Group's core portfolio have been incorporated from the University of Cambridge Graphene Centre but information on these companies has not yet been disclosed.

**University of Dundee** - In 2006 Frontier signed a 10-year relationship agreement covering all disciplines under which, in return for commercialisation support, it is entitled to receive equity in each spin-out company. However, for varying reasons the Board took the decision not to renew the relationship agreement in 2016.

<sup>4</sup> QS World University Rankings

Nevertheless, the collaboration did result in the successful spin-out of **Kinetic Discovery** in 2008 and **Exscientia** in 2012.

#### **PORTUGAL**

**Universidade de Évora, Portugal** – In 2016 Frontier signed an agreement with Evora to assist with its spin-off and licensing activities emerging from its research programmes.

**FCT, Universidade NOVA de Lisboa** - in 2016 Frontier signed an agreement with FCT NOVA to assist with its spin-off and licensing activities emerging from its research programmes. This agreement has already resulted in the 2018 spin-out of **NTPE** and **Des Solutio**.

Portfolio companies, **Celerum**, **Nandi Proteins** and **Alusid** were spin-outs respectively from Robert Gordon University, Heriot-Watt University and the University of Central Lancashire, however Frontier does not consider that it has either formal or informal relationships with these establishments.

**Frontier utilises a capital light/low cost business model that does not require the Company to support spin-out monetarily**

#### **A UNIQUE BUSINESS PROPOSITION**

The key point that differentiates Frontier from other IP commercialisation businesses is the provision of founder equity to Frontier in the spin-out company in exchange for hands-on support through the IP commercialisation process. Some other businesses specialising in the provision of IP commercialisation can require a large balance sheet from which the business finances portfolio companies from initial seed funding to regular injections of capital in future funding rounds as the commercialisation process matures.

**Costs relate specifically to management time devoted to supporting each spin-out**

Frontier's costs relate specifically to management time devoted to supporting and advising the spin-out companies which may also involve being appointed their Boards. This of course ultimately requires the recruitment of a suitable level of executives with the necessary mentoring and commercial skills. Frontier may also invest its own cash into selected portfolio holdings, or assist with special aspects of technology development, but is not obliged to do so.

In its model, following intensive due diligence on the value and potential commerciality of the IP, Frontier undertakes to provide a number of services to the founder/academic and university in exchange for free founder equity. The support thus provided includes, but is not limited to:

- Building a management team and business plan.
- Identifying routes to market.
- Early customer engagement to ensure a strong business and market focus from the outset and analysing progress on a regular basis against operational and technical milestones.
- Providing access to capital via financial institutions for raising seed/venture capital and potential IPO/trade sale.

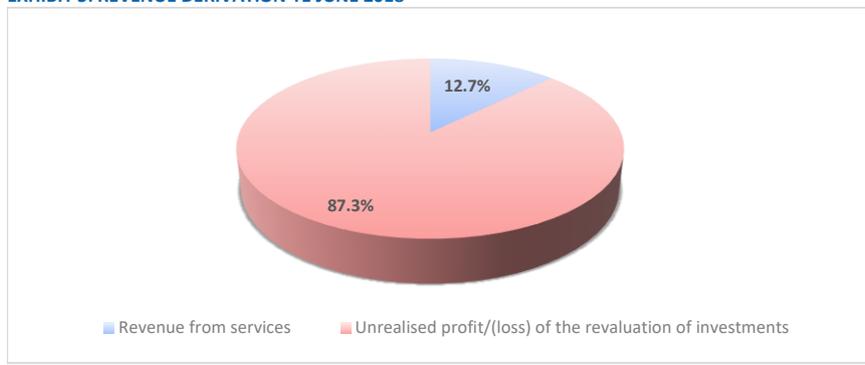
**Frontier only generates modest revenues and on a relatively high cost base does not generate profits or cash**

Thus, as a provider of services, mostly free to its university/spin-out clients, the Group's Income Statement shows only modest revenue generation which typically derives from services rendered, such as directors' fees and retainers. Given the low level of revenues against a relatively high cost base, the Group typically consumes cash.

Main item in the P&L is the p.a. change in fair value of the portfolio companies the inclusion of which results in reported profits but adjusted losses.

However, the most significant item in the Income Statement is the annual change in the fair value of its portfolio companies which is a quasi mark-to-market exercise. Given that this accounting item is normally (but not necessarily) a positive number, the Group has in recent years shown a profit before tax.

EXHIBIT 5: REVENUE DERIVATION YE JUNE 2018



Source: Frontier IP

Cash generation and profits only normally occur on an exit or partial exit

As the change in fair value is merely an accounting item, the profit reported by the Group is not analogous to cash generation and hence the Company is not cash generative in the normal course of events. Cash generation would only occur on an exit or partial exit of a portfolio company. Thus, the valuation model is very much based on the fair value of the underlying portfolio holdings and not Group earnings.

Frontier seeks to exploit links and connections between companies, defined by the Company as cluster

#### A CLUSTERED PORTFOLIO

While the individual core portfolio spin-outs are quite separate entities with their own roadmaps to IP commercialisation there are links and connections between the individual technologies which the Company defines as clusters of interests. The Group aims to exploit these links and connections to share commercial relationships, market and technology insights across different sectors. In some cases, the scale up challenges are similar across sectors – for example, both the food and pharmaceutical industries might use industrial-scale spray-drying techniques to make their products. In addition, portfolio companies may fit into more than one cluster.

Examples of clusters within the Frontier IP portfolio include:

**Engineered particles and materials** - there is a large amount of research in these areas which is not matched by expertise in scaling up production once need is identified. The challenge is usually moving from a laboratory-based batch process, where products are made one at a time, to a mass-manufacturing continuous flow process. In Frontier's portfolio, companies falling into the engineered particles and materials cluster include **Alusid, Nandi Proteins, PoreXpert, NTPE** and **Tarsis**.

**Cell-based medicines and imaging** - key market trends the Group is addressing include the need for quicker diagnostics in health and other sectors, such as food and environmental where technology can provide a step change in value/opportunity through rapid and simpler detection methods; and rapid delivery of customised, personalised medicines. Frontier portfolio companies fitting this cluster include **Amprologix, Molendotech** and **The Vaccine Group**.

**Artificial intelligence, big data and robotics** - The opportunities are being driven by: an ability to collect data quickly and cost effectively; an ability to transmit ever-increasing amounts of information; and an ability to process huge amounts of data to create useful information and models. Portfolio companies addressing these industrial needs include **Cambridge Simulation Solutions, Exscientia, Fieldwork Robotics** and **PoreXpert**.

## THE CORE PORTFOLIO COMPANIES

In the following pages we provide information regarding the core portfolio companies which are:

**1. ALUSID**

Recycled commercial and residential tiles and solid surfaces (2012) – 35.6%

**2. AMPROLOGIX**

Introduction of new antibiotics to tackle antimicrobial resistance (2018) - 10.0%

**3. CAMBRIDGE SIMULATION SOLUTIONS**

Simulation and control of complex chemical processes (2014) – 40%

**4. DES SOLUTIO**

Safer alternatives to chemicals used in beauty care and other products (2018) – 25%

**5. EXSCIENTIA**

Automated small molecule drug design and discovery (2012) – 4.1%

**6. FIELDWORK ROBOTICS**

Agricultural robotics for harvesting of fruit and vegetables (2017) – 27.5%

**7. MOLENDOTECH**

Identification of faecal bacteria in water (2017) – 14.1%

**8. NANDI PROTEINS**

Functional protein as replacement of fat/sugars in processed food (2011) – 20.7%

**9. NTPE**

Printing electronic circuits onto cellulose-based paper (2018) – 31.6%

**10. POREXPERT**

Software and consultancy for modelling porous systems (2012) – 15%

**11. PULSI V SOLAR**

Improving power take-off from photovoltaic solar panels (2013) – 18.9%

**12. TARSIS TECHNOLOGY**

Controlled delivery of active ingredients using MOFs (2016) – 18%

**13. THE VACCINE GROUP**

Design of herpesvirus-based vaccines (2017) – 19.2%

In addition, there are two further core portfolio companies incorporated from the University of Cambridge Graphene Centre. Full details of these two companies have not yet been disclosed.

## ALUSID LIMITED



### ACTIVITIES

Alusid was a spin-out of the University of Central Lancashire in 2012. It owns the IP for a process that converts waste porcelain and glass into recyclable commercial and residential floor/wall tiles and solid surfaces up to 2.4 metres long and 1 metre wide using a low energy, sintered process that does not involve the use of resins or cement.

Its products (trade name SilicaStone) are fire, frost, chemical and UV resistant and raw materials are derived from recycled ceramics, including sanitary ware waste, glass waste and glaze waste, all of which are provided free under multi-year agreements. This waste would otherwise typically go into landfill at a substantial cost to the production companies.

Given the relatively low energy cost of the process compared to traditional tile manufacturing and the free issue of raw materials, we believe that SilicaStone products benefit from a higher gross margin and potentially lower retail price points than traditional tiles (many of which are imported from Europe) and solid surface dimension stone.

### CURRENT POSITION AND POTENTIAL

Based in Preston, Lancashire, Alusid currently has three batch-process kilns that are utilised for development, testing and small-scale commercial production with a capacity of 4,000<sup>2</sup>m per annum.

Alusid has been in discussion with SACMI for a number of months with regard to the purchase and construction of an automated full-scale commercial production plant at a cost of around £17m (including working capital) and funding options currently include a possible IPO of the business on AIM together with regional grants. SACMI is an Italian international manufacturer of machines and complete plants for the ceramic tile industry. Alusid is currently in talks to secure corner stone customers to help generate initial revenues.

### FUNDING

Alusid raised £266,000 in March 2015 and £1.34m in September 2018 and may seek to raise further funds in an IPO as noted above.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier participated in the 2018 funding round and currently holds a 35.6% stake in Alusid worth £1.38m and we would expect to see a significant uplift in valuation following a successful IPO.

## AMPROLOGIX



### ACTIVITIES

Amprologix is a spin-out from the University of Plymouth in 2018. The company was established to introduce new antibiotics, helping to tackle antimicrobial resistance, a major threat to human health globally. It will develop and commercialise the work of Dr Mathew Upton, Professor in Medical Microbiology at the University's School of Biomedical Sciences.

### CURRENT POSITION AND POTENTIAL

The first product from the Company is expected to be a cream containing epidermicin, one of the new antibiotics being developed to combat infections caused by antibiotic-resistant bacteria. Epidermicin can rapidly kill harmful bacteria including MRSA (methicillin resistant *Staphylococcus aureus*), *Streptococcus* and *Enterococcus* at very low doses, even if they are resistant to other antibiotics.

No new classes of antibiotics have been introduced into clinical use for the past 30 years, and the company is aiming to meet a growing need for new antibiotics as harmful microbes become increasingly drug resistant.

It has already secured industry involvement through a partnership with world-leading biotechnology and synthetic biology company Ingenza.

The company is focused on four areas: a) Developing epidermicin for commercial use; b) discovering additional sources for new classes of antibiotics; c) using Artificial Intelligence to improve antibiotic properties, working with Ingenza, IBM and the National Physical Laboratory and d) developing efficient techniques to manufacture antibiotics at scale in partnership with Ingenza.

In a relevant infection model, a single dose of epidermicin was as effective as six doses of the current standard of care. The antibiotic was initially recovered from a skin bacterium named *Staphylococcus epidermidis* but can now be produced in a microbe suitable for industrial scale-up, using synthetic biology methods developed by Ingenza.

Professor Upton initially developed the patented technology working closely with UMI3 Ltd at The University of Manchester, which now has a 13 per cent stake in the business.

### FUNDING

Given its early stage Amprologix has not raised any funds to date.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier has taken a 10% stake in Amprologix.

## CAMBRIDGE SIMULATION SOLUTIONS



### ACTIVITIES

Cambridge Simulation Solutions is a 2014 spin-out from the University of Cambridge Department of Chemical Engineering and Biotechnology and was formed to commercialise the work of Dr Vassilios Vassiliadis.

Cambridge Simulation Solutions is developing advanced software to simulate and control complex, discontinuous processes, such as the way neural transmitters work in the brain.

Dr Vassiliadis considers that “the aim of Cambridge Simulation is to produce a rapid integrator engine suitable for a range of applications and industries, including Chemical Engineering, Biotechnology, Biomedical, Pharmaceuticals, Aerospace and Microelectronics.”

### CURRENT POSITION AND POTENTIAL

Frontier IP is providing proactive hands-on support with the team actively developing and refining software applications.

Encouraging progress has been made to date.

### FUNDING

Given its early stage Cambridge Simulation has not raised any funds to date.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier has taken a 40% stake in Cambridge Simulation.

## **DES SOLUTIO**

### **ACTIVITIES**

Des Solutio has been established to develop safer and greener alternatives to the chemicals currently used to make beauty, pharmaceutical, personal care and other products. It is seeking to commercialise the research of Associate Professor Ana Rita Duarte and Dr Alexandre Paiva, of Portugal's NOVA University Lisbon, NOVA School of Science and Technology.

Des Solutio is developing new methods to use Natural Deep Eutectic Solvents ("NADES") in cosmetics, nutraceuticals and other applications, to replace toxic organic solvents, such as ethanol, employed currently. Solvents are commonly used in a wide range of industries to extract active ingredients from natural matrices, such as olive oil, mint or seaweed to flavour and scent their products, and enhance the shelf-life and stability of the bioactives.

NADES offer many benefits over existing solvents. Found in a vast range of plants, and so compliant with a green chemistry philosophy, they are entirely derived from natural compounds such as organic acids, amino acids and sugars.

As there are a vast range of NADES already identified, they can be matched to specific active ingredients to extract only what is needed. There is no need to recover an active ingredient from a NADES, unlike conventional solvents, some of which are too toxic for use on skin or in foods.

Other advantages of the technology include improved solubility, permeability and bioavailability of the active compounds, better biodegradability than many organic solvents and greener production processes.

### **CURRENT POSITION AND POTENTIAL**

Des Solutio's research has already attracted interest from several major industrial groups, including a world-leading cosmetics company and a major pharmaceutical company. In return for its stake, Frontier IP will provide Des Solutio with a broad range of commercialisation services, including contract negotiation and identifying and working with potential industry partners to validate and scale up the technology.

### **FUNDING**

Given its early stage Des Solutio has not raised any funds to date.

### **FRONTIER SHAREHOLDING AND VALUATION**

Frontier has a 25% equity holding in Des Solutio.



Illustration by Michele Marconi

## EXSCIENTIA LTD

### ACTIVITIES

Exscientia was a spin-out from the University of Dundee in 2012 and is at the forefront of AI-driven drug discovery. It claims to be the first company to automate small molecule drug discovery and its AI-driven systems actively learn best practice from the vast repositories of discovery data available. With better information to hand than any researcher could acquire individually, its knowledge-driven systems design millions of novel, project-specific compounds and pre-assess each for predicted potency, selectivity, ADME (absorption, distribution, metabolism and excretion) and other key criteria.

Rapid design-make-test cycles ensure swift progress towards desired project goals and the company has already delivered exceptional productivity, generating candidates in roughly one-quarter of the time of traditional approaches.

### CURRENT POSITION AND POTENTIAL

**EVOTEC.** In 2016, Exscientia entered into a collaborative partnership with Evotec AG to discover first-in-class bispecific small molecule immune-oncology therapies.

**SANOFI.** In May 2017, Exscientia announced a multiple-product development and licence option agreement with Sanofi in the high-interest area of metabolic disease. For compounds reaching agreed delivery criteria, a series of milestones covering both non-clinical and clinical may be payable by Sanofi. Any licensed products reaching the market will qualify for recurrent sales milestones. The total amount potentially payable by Sanofi to Exscientia on achieving these milestones is EUR250 million.

**GLAXOSMITHKLINE.** In July 2017, Exscientia entered into a strategic drug discovery collaboration with GlaxoSmithKline (GSK) whereby Exscientia will combine its AI-enabled platform with the expertise of GSK in order to discover novel and selective small molecules for up to 10 disease-related targets, nominated by GSK across multiple therapeutic areas. In addition to research funding, Exscientia is eligible to receive near-term lead and pre-clinical candidate milestones if all objectives are achieved. The total amount payable by GSK to Exscientia on achieving these milestones is £33 million, if all 10 projects are advanced.

### FUNDING

In September 2017, Evotec subscribed €15m for a minority stake in Exscientia stating that was its *“single biggest equity placement to date and in, what we feel is, the world leading AI technology company”*. At the same time Dr Mario Polywka, COO of Evotec joined Exscientia’s Board.

### FRONTIER SHAREHOLDING AND VALUATION

Exscientia is an example of a more mature portfolio company and more akin to an investment rather than a seed business where Frontier would no longer be required to provide as much support to the commercial development of the IP or the business. With an initial equity stake of 5.56% we would not expect Frontier to participate in any future funding rounds and this factor, together with the Evotec subscription, means that Frontier’s equity in Exscientia is, relative to holdings in its other portfolio companies, now quite low at 4.1%.

However, the momentum and increasing recognition of Exscientia as a world leader in AI-driven drug discovery suggests to us that its value will increase substantially and could be worth multiples of its current contribution to Frontier’s NAV.

## FIELDWORK ROBOTICS

### ACTIVITIES

Fieldwork Robotics was a spin-out company from Plymouth University in 2017 utilising the technology developed by Dr Martin Stoelen and his team. The company is developing soft, adaptable robot arms and highly sensitive grippers that are able to handle delicate items.

Through Frontier's help and following interest from the industry, Fieldwork Robotics has been able to accelerate development of its agricultural robots and develop a proof-of-principle, field-test-ready prototype robot for harvesting soft fruit and vegetables.

### CURRENT POSITION AND POTENTIAL

Three patents have been applied for and Fieldwork has a licence from the University of Plymouth to use the intellectual property relating to the system's robotics. Fieldwork has recently entered into a collaboration agreement with leading UK soft fruit grower Hall Hunter Partnership to prototype and field test a raspberry harvesting robot system. Field tests are expected to commence in Autumn 2018.

Once the technology has been successfully tested with raspberries, among the softest and most easily damaged fruit to pick, then it can be easily adapted to other fruit and vegetables. The Company is developing proof-of-concept robots for other crops following interest from leading agribusinesses

### FUNDING

Fieldwork is participating in a number of grant-funded projects, including cauliflower and, in China, tomato harvesting

### SHAREHOLDING AND VALUATION

In April 2018, Frontier agreed to provide extra development and engineering support to the company in return for increasing its stake from 21 per cent to 27.5 per cent.



## MOLENDOTECH

### ACTIVITIES

Molendotech is a 2017 spin-out company from the University of Plymouth and has developed a novel test which is able to identify the concentration of faecal bacteria in water. Current tests on the market may take hours or even days to show results, whereas Molendotech's technology typically produces results in 15 minutes. Its rapid, point-of-use test to determine water quality enables more informed decision-making about the use of water and significantly improves the ability to identify and track any pollution source.

### CURRENT POSITION AND POTENTIAL

The Company recently entered into a collaboration agreement with Palintest Limited ("Palintest"), a subsidiary of FTSE-100 company Halma plc, for the development and licensing of water testing products. Palintest is a leading company in the design and manufacture of water analysis technologies, supplying a comprehensive range of precision instruments for multidisciplinary analysis.

Molendotech's water testing product for recreational bathing is already on the market and the company is in the process of developing further products for the water testing market, in collaboration with Palintest.

In October 2018 the company announced a collaboration agreement to develop water tests for G's Group, one of Europe's leading fresh produce companies. Molendotech will work with G's to create tests to detect the levels of different bacteria in produce, irrigation, washing water and food contact areas. Work is expected to start immediately. Adoption of the technology being developed for G's could potentially cut the time to conduct the tests from up to two days currently to less than an hour.

### FUNDING

Molendotech completed its first fundraising in February 2018 having received a commitment for a total of £0.5m which was invested in three tranches. This capital has been raised to support the development of further water testing products, initial sales and its expansion into new markets.

### FRONTIER SHAREHOLDING AND VALUATION

Prior to the fundraising, Frontier had a 20% stake in Molendotech. Following the fundraising event Frontier's holding has reduced to approximately 14.1% but arguably in a much more valuable company. The reduction in Frontier's shareholding reflects the fact that Frontier did not participate in the funding round.



## NANDI PROTEINS

### ACTIVITIES

Nandi was spun out of Heriot Watt University, Edinburgh and utilises its technology to improve the functional properties of common proteins found in egg, whey, vegetables and pulses through a controlled process of heat, time and temperature. These improved functional proteins can significantly reduce the sugar, fat and additive content in processed foods and ingredients.



By replacing the bulking sugar agents found within many processed foods with its own added-value proteins Nandi enables food manufacturers to produce foods with clean labels (with no e-number additives) and at a lower cost without compromising taste or texture. Global food and ingredient companies are the target customers including manufacturers of cakes, chocolate, nutritional drinks and meat products such as sausages and burgers.

For the customer the benefits include:

**Competitive advantage** through the production of healthier products without negatively affecting taste.

**Increased market share** as consumer preference shift towards products that are healthier, but which provide the same eating experience.

**Clean label**, through the elimination of emulsifiers and Nandi Proteins being based on common food ingredients (i.e. a Nandi Protein in a chocolate bar would appear as “milk solids”).

**Ease of adoption** – inclusion of Nandi Proteins can be implemented on existing manufacturing lines allowing rapid scale up and little capital investment.

**Reduce a threat of legislative intervention** – increasingly likely as the obesity crisis deepens.

### CURRENT POSITION AND POTENTIAL

Nandi has been working extensively with yeast and bakery ingredients business, AB Mauri (an operating division of Associated British Foods), testing its proteins in cakes and muffins with very positive results. In an internal AB Mauri blind tasting trial, 15 participants were encouraged to select their preferred cake sample based on taste and texture. All 15 selected a Nandi Protein trial against a normal loaf cake. In addition, Nandi has demonstrated a collagen fat replacer which could be used in sausage and other meat products without affecting taste or texture. A joint £1m Innovate UK grant has been awarded to Nandi and Heriot Watt, with Devro plc and Kerry Foods as commercial partners.

Nandi is also working with Acerchem, a Chinese health and nutraceutical group with sales in 40 countries, regarding the development of a sports nutritional drink using Nandi-modified rice proteins.

### FUNDING

Nandi raised £660,000 in November 2014, £250,000 in March 2016 and £1m in July 2017, the latter at a post-new money valuation of £11m.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier has participated in previous funding rounds and currently holds a 20.7% stake in Nandi worth £2.3m.

## NTPE

### ACTIVITIES

In August 2018, Frontier announced its first Portuguese spin-out company NTPE. NTPE is developing novel technology called Paper-E to print electronic circuits, sensors and semiconductors onto any cellulose-based paper and is a result of the Group's formal relationship with the Universidade Nova de Lisboa Faculty of Science and Technology ("FCT NOVA").

The technology replaces the silicon used in electronics with eco-friendly metal oxides and cellulose, to create "inks" that can be used in specially adapted printers and printing technologies, such as ink-jet heads. It has been developed by a research team led by Professors Rodrigo Martins and Elvira Fortunato from FCT Nova.

NTPE will develop and commercialise its work. There is a huge range of industrial applications for the technology, including paper-based diagnostic kits, smart packaging, logistics, and many others.

The technology has been developed within a research group from the materials department of FCT NOVA, national scientific research centre Cenimat and the Centre of Excellence in Microelectronics, Optoelectronics and Processes. They bring together more than 65 researchers dedicated to new approaches in electronic materials and applying them to build novel electronic devices and systems.

### CURRENT POSITION AND POTENTIAL

Non-governmental organisations in low and middle-income countries are keen to explore the technology for use in real time lab-on-paper diagnostic solutions. This is because it does not need a power source and results can be shared via mobile phones. The technology can also produce disposable smart electronic interfaces for near field and Radio-frequency identification, RFID, communications.

### FUNDING

NTPE has not raised any funds to date.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier has been given founder equity representing 31.6% of the company.



## POREXPERT

### ACTIVITIES

PoreXpert was a spin-out from Plymouth University in 2012 and was formed to accelerate the commercialisation activity of the Environmental and Fluid Modelling Group at Plymouth which provides software and consultancy for modelling porous systems.



PoreXpert Ltd provides software and consultancy services for the characterisation and optimisation of porous materials. In partnership with Thermo Scientific and Porometer NV, it provides PoreXpert software, for sale or consultancy, which generates a three-dimensional simulation of the voids within a sample, based on porometry, porosimetry or, less directly, electron or optical microscopy.

The quantitatively matched structure can then be used to simulate properties that include depth filtration efficiency and absolute permeability. The software also has a 'targeted modification' feature which allows the user to make alterations to the structure virtually and thus optimise the properties of material in a cost-effective manner or simulate future effects such as weathering.

The experimental work carried out by PoreXpert Ltd, to supply the very high quality data required by the PoreXpert software, is ISO 9001:2008 accredited ensuring best possible procedures and complete calibration to international standards.

### CURRENT POSITION AND POTENTIAL

Many of the uses of PoreXpert by customers remain confidential. However, the University of Queensland has allowed the company to report that they are using the software to model the water flood of coal to produce coal gas. They have purchased a user support package and PoreXpert has helped them set up the model.

### FUNDING

To date PoreXpert has been self-funding.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier was initially granted founder equity of 15% in the business.

## PULSIV SOLAR



### ACTIVITIES

Pulsiv Solar was incorporated in 2013 to develop and commercialise the work of Dr Zaki Ahmed, associate professor in information technology at the School of Computing, Electronics and Mathematics at the University of Plymouth. The technology is protected by three patent families, each with patents granted in the US and in the UK.

### CURRENT POSITION AND POTENTIAL

In July 2018, Innovate UK, the UK's innovation agency, awarded University of Plymouth spin-out Pulsiv Solar £129,929 towards a £288,732 project, run in collaboration with specialist consultancy Eastmap. Eastmap is run by design engineer Andy Hills, a specialist in power conversion and magnetics technology. He has worked for McLaren, Dyson and micro-inverter manufacturer Enecsys. The project will complete the technological development of its solar micro-inverter by April 2019.

Solar micro-inverters are plug-in devices that convert direct current (DC) electricity generated by photovoltaic cells to alternating current (AC) used in electrical grids. In laboratory conditions, Pulsiv has demonstrated its technology is significantly more energy efficient than existing micro-inverters.

The aim of the technological development is to create a micro-inverter ready for scale up and commercialisation providing efficiency improvements of at least 5 per cent over current market leaders. The micro-inverters can be used either as new or retrofitted to existing solar panels.

Other applications being explored for the technology include improving the energy efficiency of power converters used in a huge range of consumer devices, such as televisions, mobile phones and laptops. The technology and the early results achieved have attracted strong interest from major industrial and consumer electronic groups.

### FUNDING

To date Pulsiv Solar has raised £500k in its first funding round.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier IP holds an 18.9% stake in the Company.

## TARSIS TECHNOLOGY

### ACTIVITIES

Tarsis Technology was incorporated in 2016 to develop and commercialise technology created by Dr. David Fairen-Jimenez and his team at the Department of Chemical Engineering and Biotechnology at the University of Cambridge.

Tarsis specialises in developing metal-organic frameworks (MOFs) for the slower and more controlled delivery of active ingredients, such as agricultural chemicals.

MOFs are highly porous crystalline materials combining organic and inorganic building blocks; they can absorb a relatively large volume of an active ingredient compared to other types of particles. The problem facing researchers in the past has been controlling the flow of the active ingredient from the particles - because they are porous, the ingredients leak out too quickly.

Tarsis has developed a way of collapsing MOFs to lock an active ingredient inside the particle. There are many thousands of MOF particles, with different properties, including the rate at which they dissolve. Depending on which one is used, an active ingredient can be released over minutes, days or even months, or in response to climate or environmental changes.

### CURRENT POSITION AND POTENTIAL

In July 2018 Tarsis announced that it had entered into a collaboration agreement with one of the world's leading manufacturers of crop-protection products. The collaboration will research the use of Tarsis' patent-pending technology to deliver chemical pesticides and fungicides in a more precise and controlled way.

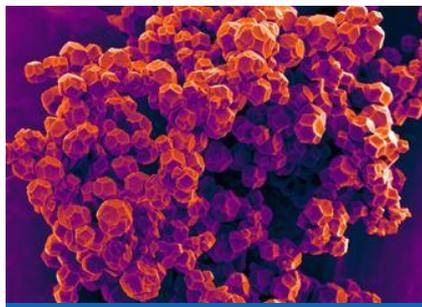
This company will fund the entire research programme in return for exclusive rights to Tarsis' intellectual property for a defined set of agrochemicals. Tarsis will be paid a royalty fee for any commercially viable products that result.

### FUNDING

To date Tarsis has been self-funding. However, Frontier has agreed to lend up to £150,000 to Tarsis to meet working capital requirements in return for equity options.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier has an equity stake of 18% in Tarsis.



## THE VACCINE GROUP



### ACTIVITIES

The Vaccine Group is a 2017 spin-out company from the University of Plymouth and is seeking to exploit the technology developed by Dr Michael Jarvis, Associate Professor in Virology and Immunology at the University of Plymouth, who specialises in the creative design of herpesvirus-based vaccines for the control of disease.

### CURRENT POSITION AND POTENTIAL

The Vaccine Group aims to commercialise novel vaccine platforms for the development of vaccines for use in infection control (such as bovine tuberculosis) and for a rapid response to pathogens which unpredictably cross the species barrier and pose a significant threat to human health. Target pathogens include avian influenza A, Ebola and Marburg viruses, MERS and SARS coronaviruses and Rift Valley fever virus.

Dr Jarvis' work has previously received funding from a number of sources, including Innovate UK, National Institutes of Health and the Medical Research Council. Initial work in The Vaccine Group will focus on herpesvirus-based platforms suitable for use in animals, to protect human health by targeting the animal species from which disease is transmitted to humans, for vaccination (termed zoonoses barrier vaccines).

Future developments will include vaccines for use in humans.

In August 2018 the company was awarded a £50k grant from the Bacterial Vaccinology Network to support the development of a vaccine to combat E.coli in cows, one of the three main bacteria that causes bovine mastitis.

### FUNDING

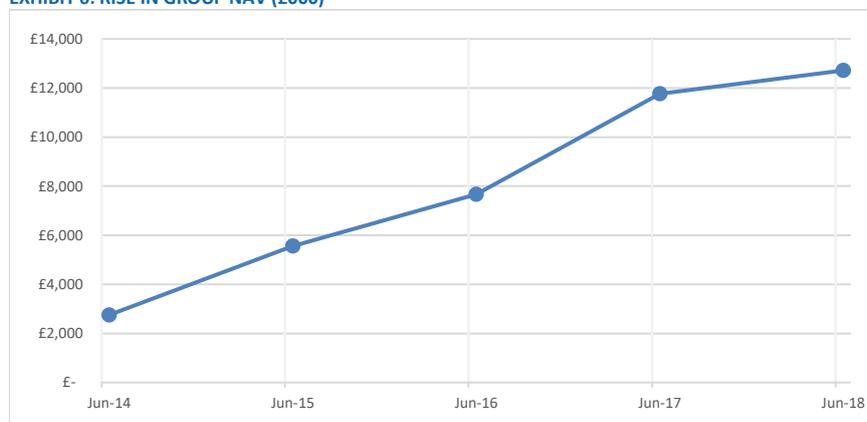
To date The Vaccine Group has been self-funding through grants and loans but has yet to generate any profits.

### FRONTIER SHAREHOLDING AND VALUATION

Frontier has received a 19.2% equity stake in The Vaccine Group.

## VALUING THE PORTFOLIO

EXHIBIT 6: RISE IN GROUP NAV (£000)



Source: Frontier IP

Valued, where appropriate, in accord with IPEV Guidelines

The fair value of unquoted holdings is arrived at, where appropriate and where possible to do so, in accordance with International Private Equity and Venture Capital Valuation Guidelines (IPEV Guidelines). These Guidelines are embodied in a 57-page document which represents current best practice on the valuation of private equity holdings.

However, the majority of the Group's holdings are in seed, start-up and early-stage companies, often with no revenue, earnings or positive cash flow, thus making it difficult to assess the value of its IP and to reliably forecast future cash flows. Consequently, the Group considers that the price of a recent third-party funding provides the best estimate of fair value. The Group normally receives its initial equity prior to any third-party funding and in certain instances portfolio companies can progress for some time without such funding. In selecting the most appropriate valuation technique in estimating fair value, the Group uses a standard valuation matrix to categorise companies based on IPEV Guidelines.

Although Frontier does not disclose individual company valuations or the stages that they are valued at in the accounts, we estimate the valuation matrix as follows:

**Stage 1** – When the Group has received its initial equity prior to the transfer of IP to the spin-out company, that company is valued at a notional £50,000. To date, the Group has announced four such holdings in its core portfolio:

- Amprologix
- Celerum (non-core)
- Des Solutio
- NTPE
- The Vaccine Group

**Stage 2** – Once the IP is transferred to the spin-out company the valuation is increased by between £50,000 and £950,000 (i.e. to between £100,000 and £1,000,000) depending on the value attributable to the IP.

This is arrived at using the comparable company valuation, specifically comparing the entry price at which investors would typically invest in investor-ready, pre-revenue,

companies with IP and adjusting for management's assessment of the IP. Currently the Group has three such holdings:

- Cambridge Simulation Solutions
- Fieldwork Robotics
- Tarsis Technology

**Stage 3** – Valuation is based on management's assessment of performance against milestones, discussions of likely imminent fund raising and considerations of impairment. Currently the Group has two such holdings:

- Exscientia
- PoreXpert

**Stage 4** - If the spin-out company receives third party funding, the price of that investment will provide the basis for the valuation, the valuation technique being the transaction price paid for an identical instrument:

- Alusid
- Molendotech
- Nandi Proteins
- Pulsiv

**Stage 5** - As the company develops and generates predictable cash flows a combination of valuation techniques are applied as appropriate, such as discounted cash flow, industry specific valuation models and comparable company valuation multiples. Currently the Group has no holdings in this category.

A final point to consider on fair value assumptions arrived at following a fund-raising event is that the validity of a valuation obtained in this way is inevitably eroded over time, since the price at which an investment was made reflects the effects of conditions that existed on the date that the transaction took place.

In a dynamic environment, changes in market conditions, the passage of time itself and other factors will act to diminish the appropriateness of this valuation technique as a means of estimating value at subsequent dates.

#### **Avoiding a conflict of interests**

Frontier's valuation techniques are judged by us to be conservative. In many other IP commercialisation companies, valuations of individual portfolio companies are derived from the valuation implied by the price of the latest fundraising event. In many cases this price can be dictated at the whim of the major investees, including in some circumstances the IP commercialisation company itself. Thus, we believe there can at least in theory be a conflict of interests which could lead to an overly optimistic and/or unrealistic valuation of the individual portfolio company as well as that of the parent company.

Frontier avoids this conflict as in the first instance its equity stake is gifted in exchange for commercialisation services rather than paid for and is valued on a notional and prudently subjective basis. In addition, although it may, it is not obliged to invest in fund raising events. Even though it may decide to participate it would probably be a minority investor with little pricing power, being a price taker rather than a price maker with the majority of funds being raised from third party investors.

Consequently, we believe that the valuation of Frontier's individual portfolio companies are at best conservative and at worst, realistic.

**Frontier's holdings are not sensitive to conflicts of interest on valuations**

### Equity holdings treated as investments – not associates

Although the majority of Frontiers' stakes are between 10% and 40% of the total equity of each portfolio company, the Group elects to hold such holdings at fair value in the accounts rather than treat them as associate companies. This is permissible in accordance with IAS28 - Investments in Associates and Joint Ventures - and permits holdings held by entities which are similar to venture capital organisations to be excluded from its scope where those holdings are designated, upon initial recognition, at fair value through the Income Statement.

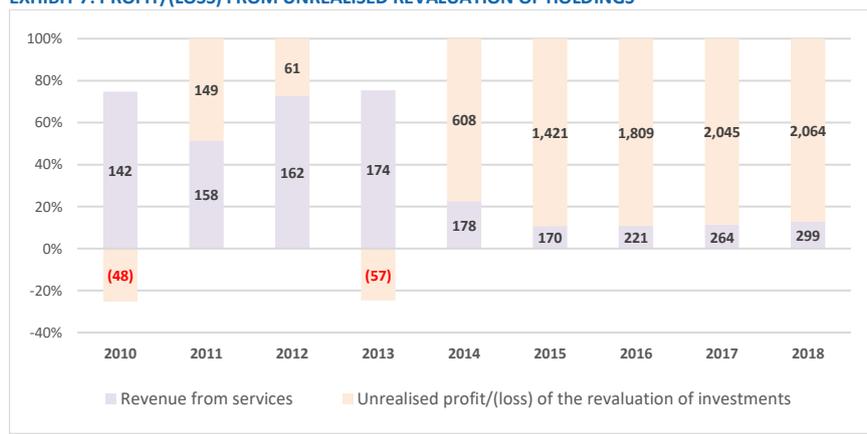
Holdings held with a view to realisation of capital gains and are thus classified as financial assets at fair value...

Frontier's holdings are held with a view to the ultimate realisation of capital gains and are classified as financial assets at fair value and as a result, Frontier's income statement and profit is dominated by the contribution from unrealised profit or loss on the revaluation of holdings.

... which are revalued (normally positively) on an annual basis

Since its listing on AIM in 2011 these gains and losses have formed the majority of revenues as can be seen in Exhibit 7 below and in two of those years (2010 and 2013) those holdings were deemed to have decreased in value, albeit these occurred in the early days of the build-out of the portfolio. Over the past four financial years the changes to the fair value of holdings have been highly positive and in the past three years have represented an average of 89% of total revenue.

EXHIBIT 7: PROFIT/(LOSS) FROM UNREALISED REVALUATION OF HOLDINGS



Source: Frontier IP

Another consequence of the inclusion of changes in fair value through the Income Statement is that they do not represent tangible revenue or cash for the Company. As a result, the Group does not, and in all likelihood will never, generate cash in the normal course of its business. Cash generation will only occur when investments are realised through a sale event, thus in the absence of such events the Group will require regular funding.

However, the principal attraction of the business is that such events, when they occur, should realise substantial capital appreciation, primary overall investment returns and cash. This, coupled with the number of high quality portfolio companies, suggests that such events will become an increasing trend as the portfolio companies mature. The cash generated from even just one sale event would likely fund the Group for a good period.

Since its admission to the PLUS market in 2009 and its subsequent listing on AIM in 2011, Frontier has raised a total of £10.1m including the £2.5m placing in November 2018. The fair value of its portfolio as at 30 June 2018 stood at £9m, an increase of 34% against the value a year earlier and its NAV was £12.7m (FY2017: £11.8m) including goodwill of £2m and cash of £1.1m.

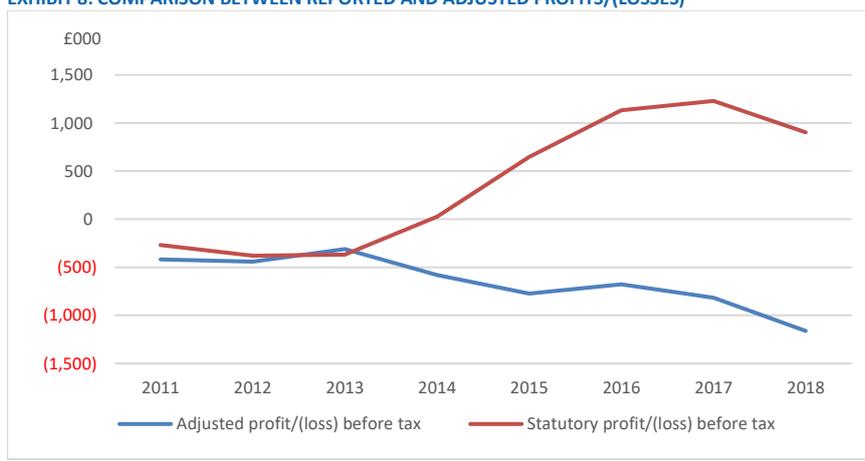
Revenues mainly reflect the yoy change in fair value of the portfolio...

## FINANCIALS

### INCOME STATEMENT

Revenue consists of licensing income and fees for services but the majority of revenue reflects the year-on-year change in fair value of the portfolio companies. Without this change in fair value the Group would report a loss before tax and Exhibit 8 illustrates the impact on the profit and loss with and without the change in fair value.

EXHIBIT 8: COMPARISON BETWEEN REPORTED AND ADJUSTED PROFITS/(LOSSES)



Source: Frontier IP

...which we would expect to rise over time

We would expect the change in fair value to increase over time as the portfolio companies successfully transit through the IP commercialisation process and to ultimately realise or exceed this valuation through a trade sale of the business or an IPO.

To date, none of Frontier's portfolio companies has effected such an exit but whereas timing is difficult to estimate, there are a number which we believe could result in a significant value increase and subsequent capital gain for shareholders over the next two to three years.

We ascribe our positive stance in this respect to the significant IP validation and due diligence process which is initiated prior to engagement with any prospective spin-out by Frontier itself and/or by third party industry participants. Without a positive validation of the IP and its commercialisation prospects Frontier will decline to participate.

It is this high-level filtering that assures the quality of the portfolio companies and provides us with the confidence that the existing portfolio has significant capital appreciation potential and that new additions to the portfolio will be added to on a regular basis without any dilution to the quality of such holdings.

### BALANCE SHEET

Frontier has a fairly simple balance sheet with net assets of £12.7m as at 30 June 2018 made up of £11.2m of non-current assets (of which £2m was goodwill and £9.1m financial assets at fair value) and current assets of £1.7m being primarily the cash balance of £1.1m and £0.6m of trade receivables. Goodwill arose on the reverse takeover of Frontier IP Group in 2009.

The liabilities side of the balance sheet totalled £0.2m at the half year, all relating to trade and other payables.

#### CASH FLOW

Aside from the sale of portfolio companies, Frontier will not generate cash from its internal activities. Consequently, in the absence of exit events it will need regular injections of capital to fund working capital and expansion. This investment would normally take the form of additional staff to support its growing portfolio of spin-out companies.

In the years since listing on AIM in 2011 Frontier has (aside from 2013) posted yoy increases in the cash utilised in operating activities. With a typical cash outflow in the movement of working capital the net cash outflow is shown at Exhibit 9 below.

EXHIBIT 9: CASH USED IN OPERATING ACTIVITIES (2012 – 2018)							
	2012	2013	2014	2015	2016	2017	2018
Cash used in operating activities	-439	-263	-548	-744	-643	-764	-1,105
Movement in working capital	-27	-171	-69	14	-162	-452	135
Net cash used in operating activities	-466	-434	-617	-730	-805	-1,216	-970

Source: Frontier IP, Allenby

We would note that the relatively high negative movement in working capital in 2017 was primarily due to a significant rise in trade receivables of £491k of which £431k related to receivables over 90 days old. By the half year much of this had unwound and at the year-end had fully reversed to an inflow of £80k.

November placing raised £2.5m gross at 65p

Together with cash used in investing activities which is normally minimal, the cash outflow was £1.2m. To fund this and past cash outflows, the Company has, over the past five years, raised a total of £6m with £3m of this being raised in March 2017 at 40p. In November 2018 the Group raised a gross £2.49m through an oversubscribed placing at 65p (equivalent to the closing mid-price the day prior to the placing announcement).

#### SHARE OPTIONS

As at 30 June 2017, there were 2,806,000 share options outstanding of which 1,335,000 had vested.

EXHIBIT 10: SHARE OPTIONS OUTSTANDING AT 30 JUNE 2018		
Outstanding	Exercise price	Expiry date
848,389	15.00p	2023
486,611	26.88p	2024
975,000	26.63p	2026
496,000	40.00p	2027
<b>2,806,000</b>		

Source: Frontier IP

Revenue and income forecasts are not relevant for Frontier

#### FORECASTS

We do not provide P&L forecasts for the Group as this primarily consists of the annual movement in fair value of the portfolio and as such does not constitute a cash item. We do however provide projections of cash flow (Exhibit 11) to illustrate the level of cash burn within the business and the recent fund raise of approximately £2.49m gross. Frontier does not generate cash through its normal operations – and would only do so as a result of an exit, or partial exit, of a portfolio company.

## CONCLUSION

### Quality core portfolio with IP validated by the executive team...

It is our belief that the attraction of an investment in Frontier is based upon the quality of its core portfolio companies and this in turn is supported by a rigorous process of due diligence in relation to the technology that is undertaken by Frontier prior to it agreeing to proceed to support the spin-out company.

### ...and by industry experts

The IP is also validated by industry experts and any resulting product or process out of the University must be replicable. This latter point is important as in a recent report<sup>5</sup> it has been shown that more than 70% of researchers have tried and failed to reproduce another scientist's experiments and more than half have failed to reproduce their own.

### Strong pipeline of future university spin-outs

Its formal and informal relationships with specific universities in the UK and Portugal have resulted in a number of high-quality spin-outs and there is no shortage of new candidates as the current pipeline of opportunities is probably more than the Company can currently handle with its existing headcount.

### Fundamentally different business model to its peer group

Each of the other six quoted IP commercialisation companies operate a business model which is fundamentally different to that of Frontier and thus the generally poor share price performance of these businesses since listing should not dissuade investors from buying into the Frontier model.

### Equity granted in exchange for commercialisation services...

The fact that its equity in the University spin-out is not purchased but rather is granted in exchange for services designed to commercialise the IP and provide access to capital when needed, especially at the early stage of incorporation immediately sets the Group apart from its peers in our opinion.

### ...and would not normally seek to invest its own capital into portfolio companies

Additionally, the Group is not an investment company; it does not typically seek to invest its own cash in its portfolio companies but rather will provide additional services for a higher equity stake or may provide small loans to accelerate certain aspects of the commercialisation process, which in turn may be repaid by future funding rounds or be exchanged for additional equity. Thus, the business operates a low cost, capital efficient model which is leagues away from the models operated by its peer group.

### Many portfolio companies at early stage development making valuation of the portfolio inherently difficult

Investors cannot value the individual portfolio companies with any accuracy as most are at an early stage of development and exercises relating to discounted cash flows ten years ahead become meaningless given the high level of assumptions and variables.

Rather, an investor in Frontier must be comfortable with the quality of the individual companies, their IP and the likelihood of successful commercialisation and ultimately capital gain.

### High quality of companies with fully validated IP

We believe that the conclusion of such due diligence should result in a realisation that the quality of the core portfolio and its inherent value is above and beyond that implied by the basic NAV indicated in the accounts.

<sup>5</sup> *Nature*, Vol 533, 26 May 2016 – Is there a reproducibility crisis?

## CASH FLOW

### EXHIBIT 11: CASH FLOW FORECASTS

Years to June	2017	2018	2019E	2020E
	£000	£000	£000	£000
<b>Cash flows from operating activities</b>	<b>-1,216</b>	<b>-970</b>	<b>-1,740</b>	<b>-1,865</b>
<b>Cash flows from investing activities</b>				
Purchase of tangible fixed assets	-5	-7	-10	-10
Investment in subsidiary	0	0	0	0
Cash acquired with reverse takeover	0	0	0	0
Net working capital acquired	0	0	0	0
Purchase of financial assets at fair value through P&L	-33	-245	0	0
Interest received	2	4	2	2
<b>Net cash generated/(used in) investing activities</b>	<b>-36</b>	<b>-248</b>	<b>-8</b>	<b>-8</b>
<b>Cash flows from financing activities</b>				
Proceeds from issue of equity	3,000	0	2,488	0
Redemption of redeemable shares	0	0	0	0
Cost of share issue	-190	0	-150	0
<b>Net cash generated from financing activities</b>	<b>2,810</b>	<b>0</b>	<b>2,338</b>	<b>0</b>
<b>Cash and cash equivalents</b>	<b>1,558</b>	<b>-1,218</b>	<b>590</b>	<b>-1,873</b>
Cash and cash equivalents at start of year	771	2,329	1,111	1,701
<b>Cash and cash equivalents at end of year</b>	<b>2,329</b>	<b>1,111</b>	<b>1,701</b>	<b>-172</b>

Source: Frontier IP, Allenby

## THE BOARD

### **Andrew Richmond – Non-Executive Chairman**

Andrew has substantial experience of the healthcare, stockbroking and private equity industries. He is Chairman of Hub North Scotland, a Lay Member of the Court of the University of Dundee and a Non-Executive Director of Scotland's Charity Air Ambulance.

### **Neil Crabb – Chief Executive**

Neil is Chief Executive of Frontier IP. He co-founded Sigma Capital Group plc and has considerable experience as an investor and director of a wide range of technology and university spin-out companies. He was previously an investment manager at Duncan Lawrie Ltd. with responsibility for a range of managed portfolios investing in smaller UK companies and unquoted technology companies, prior to which he spent four years with Equitable Life Assurance Soc., latterly as investment analyst managing investments in UK small companies and larger stocks in the electronics sector. Neil is an approved person under FSMA.

### **Jackie McKay – Chief Operating Officer**

Jackie is the Group's Chief Operating Officer, supporting the Chief Executive in the delivery of the Group's objectives. She has substantial experience of the university IP and venture capital industries and has been working with Frontier IP since its inception to help develop new and existing commercialisation relationships. Jackie spent nearly ten years at Sigma Capital Group plc, latterly as Corporate Development Director, where she was responsible for structuring and setting up venture funds and university partnerships. Prior to Sigma, Jackie spent 12 years with Bank of Scotland. She has an MA in Psychology.

### **Jim Fish – Finance Director**

Jim is Finance Director and Company Secretary of Frontier IP. He has over 25 years' experience in senior financial positions and a wide range of commercial experience including venture capital funded small/medium-sized enterprises and start-up companies. He was latterly interim Finance Director at The One Place Capital Limited, an online technology start-up. He qualified as a chartered accountant with KPMG and holds a degree in Accounting and Finance from Heriot Watt University, Edinburgh.

### **David Cairns – Portfolio Director**

David is Portfolio Director at Frontier IP and is responsible for developing and managing its equity and licensing portfolio. David has 25 years' experience in developing technology from concept through to commercialisation. He previously worked for Optos plc, the retinal imaging company, where he was instrumental in building the business from start-up, serving on the board until its flotation on the London Stock Exchange.

### **Mike Bourne – Non-Executive Director**

Mike has almost 30 years' experience in investment management and particular expertise in technology, life sciences and clean technology. He is currently Partner of Accretion Capital LLP and a Director of Cygna Negra Limited, Cygna Negra Malta Limited and Cloudfind Limited. He is also an Advisory Board Member of V2R, the US technology transfer venture company. Prior to these roles, in 1995, he founded asset management company, Reabourne Technology Investment Management Limited, where he was also Chief Investment Officer. For nine years until 2009, he was also a member of the techMARK Advisory Committee.

**Campbell Wilson – Non-Executive Director**

Campbell, who is past Chairman and currently a member of the Board of the UK Pharmaceutical Licensing Group, has worked in the UK pharmaceutical industry for approximately 35 years. The last 17 years of his career were in business development at AstraZeneca, the global research-based biopharmaceutical company, latterly as Executive Business Development Director within the company's central Business Development function. He led strategic collaboration and licensing activities at the unit, driving multiple technology and oncology therapy area collaborations and product licensing deals, including high profile and innovative agreements. Before his involvement in business development, Campbell worked in senior level scientific roles in cardiovascular drug discovery at AstraZeneca, and earlier at Beecham Pharmaceuticals (now GSK).

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#### RESEARCH RECOMMENDATION DISCLOSURE

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