

Mercia Technologies

Realising value

Mercia Technologies (Mercia) is a leading player in the funding and scaling of high growth companies from the UK regions, with a business model that is significantly de-risked vs peers. £400m of managed funds (Mercia Fund Managers, MFM) are used to predominately support all early-stage activity, whilst also providing meaningful revenue to offset group operating costs. As a result, the balance sheet investment is reserved for only the most promising companies or 'Emerging Stars' sourced from MFM. The group has a strong cash position and an experienced management, as well as a good track record, with three successful full cash exits to date. The shares trade at 0.73x NAV, not including the contribution from MFM, which we estimate at a further c 9p per share (total discount to NAV of 0.60x).

Year end	Net cash* (£m)	Direct investments (£m)	FuM (£m)	NAV (£m)	NAV per share (p)	P/NAV (x)
03/16	30.9	38.1	220.0	80.0	37.5	0.80
03/17	59.6	52.0	336.5	121.4	40.4	0.74
03/18	49.4	66.1	400.0	123.5	40.7	0.73

Note: Company data; Edison Investment Research. Note: *Includes liquid securities but not funds held on behalf of EIS investors.

A differentiated hybrid model

Mercia's differentiated business model combines managed funds (through its MFM subsidiary to nurture early-stage investment activity) and balance sheet investment, which is used to scale Emerging Stars from the MFM portfolio. The £400m profitable MFM business produced revenues of £9.6m in FY18, which offset most of the group's operating costs. MFM has c £230m cash for investment over the next 4–5 years, which should lead to a diverse pipeline for future Emerging Stars. The strong balance sheet enables the continued support of existing direct investments, while selectively expanding the direct investment portfolio with new Emerging Stars. At FY18, unrestricted cash of £49.4m provides c two years of funding.

High quality balance sheet investments

Since the IPO in 2014, net assets have increased from £11.6m to £123.5m in FY18 and the balance sheet portfolio value has risen from £9.0m to £66.1m, including a £11.9m fair value increase. The portfolio comprises many highly promising assets, where we believe there is meaningful scope for further fair value uplift and/or liquidity events. Amongst the companies profiled in this report, we particularly highlight the potential in both nDreams and Oxford Genetics. Mercia's management has a strong track record, with three successful exits to date.

Valuation: 0.73x NAV, not including FuM value

Mercia's shares now trade at a meaningful discount to NAV (0.73x). This compares to its peers such as IP Group at 0.78x and Draper Esprit at 1.68x. We note that the simple NAV calculation does not include profits generated from the growing £400m MFM business, which we estimate at a value of c 9p per share (bringing the total discount to NAV to 0.60x). Catalysts for a re-rating would include meaningful commercialisation of the direct investments and/or further successful exits.

Initiation of coverage

Investment companies

18 October 2018

Price 30p
Market cap £91m

Net cash (£m) at 31 March 2018 (including liquid securities)	49.4
Shares in issue	303.3m
Free float	23.2%
Code	MERC
Primary exchange	AIM
Secondary exchange	N/A

Share price performance



%	1m	3m	12m
Abs	(15.0)	(7.7)	(7.7)
Rel (local)	(11.7)	(0.6)	(1.8)
52-week high/low	43.5p	27.5p	

Business description

Mercia Technologies is a leading player in the funding and scaling of high growth businesses. Through its subsidiary managed funds (MFM) and its own balance sheet, Mercia provides a 'complete capital solution' to UK SMEs, with a focus on the Midlands and North UK.

Next events

H119 results	December 2018
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Analysts

Victoria Pease	+44 (0)20 3077 5740
Anne Margaret Crow	+44 (0)20 3077 5700
Dan Gardiner	+44 (0)20 3077 5700
Dan Wilkinson	+44 (0)20 3077 5734

tech@edisongroup.com

[Edison profile page](#)

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Group overview

Introduction: A complete capital solution

Mercia is a national investment group focused on the identification, creation, funding and scaling of innovative technology businesses with high growth potential from the UK regions. Through managed funds and its own balance sheet, Mercia provides a 'complete capital solution' offering a range of debt, venture and growth capital to UK SMEs. The company's strategy is value realisation through efficient and targeted provision of capital and support to selected companies that are rich in IP, scalable and require initial modest capital. The intent for both Mercia's FuM and balance sheet is the establishment of a diversified portfolio yielding a consistent flow of returns for shareholders and fund investors alike.

Mercia is halfway through its seven-year strategic plan to create a sustainable evergreen national investment business focused on sourcing regional deal flow, nurtured through its FuM before Emerging Stars are selectively brought onto the balance sheet. The business model is significantly de-risked by virtue of the fact that only the most promising companies transition from MFM to the group balance sheet. In addition, revenues from the MFM business offset the majority of group operating costs.

The first Mercia Fund was launched in January 2000, with a management buyout in January 2010 leading to the creation of Mercia Fund Managers. Mercia Technologies was listed on AIM in December 2014, whereby MFM became a wholly owned subsidiary of Mercia. In March 2016, Mercia acquired Enterprise Ventures, the leading venture provider in the North of England. Since its IPO in 2014, the company has raised a total of £110m equity (£70m at IPO). Net assets have increased from £11.6m to £123.5m, which includes a £57.1m portfolio value increase and net cash of £52.8m. Total AuM of over £500m includes £400m FuM and £66m in direct balance sheet investments. Within the MFM business, two key funds that already pay carried interest are the Rising Stars Growth Fund (RSGF, which still holds a stake in Blue Prism) and the Coalfields Growth Fund (CGF). Mercia currently has c 80 employees across nine offices in the UK regions and 19 university partners.

Investment case

- Differentiated business model of combining MFM managed funds (to predominately support early stage investment activity) with follow-on direct investment from its balance sheet to scale its Emerging Stars coming from the MFM portfolios. This significantly de-risks the business model, since only the most promising companies qualify for balance sheet investment, and the £400m FuM provides meaningful revenue which minimises net expenses.
- Strong balance sheet (£49.4m unrestricted cash) enables the continuing support of both existing direct investments while selectively expanding the direct investment portfolio with new Emerging Stars.
- Mercia has a strong UK footprint across the UK regions, where there is limited competition. This extensive regional network, combined with collaborative relationships with 19 UK universities, provides access to early-stage investment opportunities.
- Growing pipeline of future potential Emerging Stars from expanded funds under management. At FY18, MFM had £230m of free cash to invest in early-stage businesses.
- £66.1m balance sheet investment value includes very promising businesses on the balance sheet, which should lead to future fair value uplifts and/or liquidity events. On pages 12–39, we provide a detailed analysis of some of the larger companies in the portfolios: nDreams, Oxford Genetics, Impression Technologies and Intelligent Positioning.

- Management has a strong track record, with three successful exits to date. Group CIO Julian Viggars was a key player in the successful development of Blue Prism, which has returned more than 80x to investors since inception.
- Shares have fallen by c 40% since 2017 and are trading at 0.73x NAV. In addition, this valuation does not include an estimated 9p per share for the MFM business (blended value from 3x revenues/10x P/E). Including the MFM value, the total discount to NAV would be 0.60x.

Balance sheet investments

Mercia focuses its investments in the UK regions where it is able to source compelling opportunities driven by a historic under supply of capital. At FY18, Mercia's balance sheet investments amounted to £66.1m, which included the addition of three new Emerging Stars from MFM. The top 20 assets now comprise over 99% of the total portfolio value and Mercia has material equity stakes of over 25% in 11 of the top 15 assets. Looking forward, a growing pipeline of potential Emerging Stars in MFM should result in an increased number of direct investments.

The group invests across a wide variety of sectors, concentrating on scalable business models with potentially disruptive technologies. Companies are divided into four sectors: 1) software and the internet; 2) digital and digital entertainment; 3) electronics, materials, manufacturing/engineering; and 4) life sciences and biosciences.

We have listed the key highlights and fair values (on Mercia's balance sheet) for all the businesses on pages 9–10 and provide a detailed analysis for some of the most promising companies. Specifically, these include:

- **nDreams:** A leading European player for virtual reality content for gaming and experiences (see pages 12–18).
- **Oxford Genetics:** Accelerating position in growing global synthetic biology market (pages 20–25).
- **Impression Technologies:** Producer of large complex aluminium pressed units that are stronger and lighter vs peers, for automotive marques (pages 27–34).
- **Intelligent Positioning:** Software platform that combines search ranking data, market intelligence and analysis of large datasets, to inform business critical decision making (pages 35–40).

As these and other balance sheet investments mature, it is expected that syndicated investment rounds with third parties at higher valuations will occur, which should in turn lead to increasing NAV per share. Mercia concentrates on building its own stakes up to 20-40% in many of its balance sheet assets, ahead of co-investment events that should uplift value. Co-investors to date include IP Group, Invesco Asset Management, SROne, Lundbeckfonden, Woodford Investment Management, Oxford Capital Partners and Capital E. In addition, the group has co-invested with Chinese corporates and significant Family Offices.

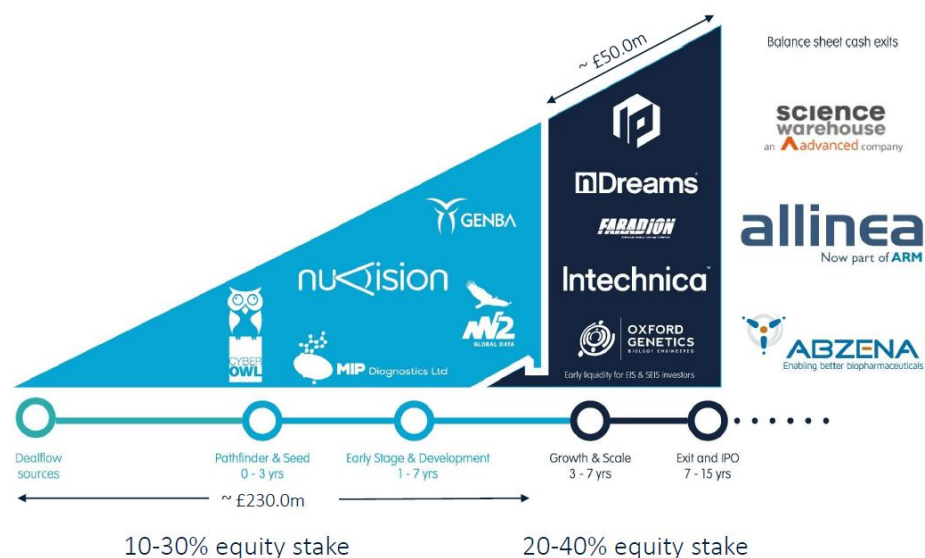
Funding rounds/exits to date

Ultimately, Mercia aims to realise value through positive revaluations and specifically through liquidity events. The three cash realisations to date are:

- **Allinea** (University of Warwick). Sold to ARM in December 2016 for a total consideration of £18.1m. This resulted in a realised gain of c £1m for Mercia and an IRR of c 55%.
- **Science Warehouse** (Leeds University): sold to Advanced Business Software and Solutions in March 2018 for a total consideration of £9m. This resulted in a realised gain of £0.6m for Mercia and an IRR of c 5%.

- **Blue Prism** (north of England, fund investment, RSGF). The first investment into the company (before it was owned by MFM) was in 2004, with equity divestments in 2016 and 2017. The total return to date since inception has been c 80x (c £70m). We note that this investment was in a managed fund rather than a direct balance sheet investment.

Exhibit 1: Complete capital solution investment plan



Source: Mercia Technologies

Mercia Fund Managers: £400m FuM

Mercia's fund management subsidiary business manages c £400m of third party funds, comprising not only tax efficient Enterprise Investment Scheme (EIS) and venture funds, but also private equity and debt funds. MFM is largely focused on early-stage companies that could eventually benefit from follow-on funding by Mercia. Altogether, FuM has increased from c £30m at the time of the IPO in 2014 to £336m in FY17 and £400m at FY18. Partly as a result of winning new mandates at end 2017/ beginning 2018, at FY18 MFM had c £230m cash, which it will steadily invest in promising early-stage businesses over the next 4-5 years.

Revenues from MFM totalled £9.6m in FY18 vs £6.4m in FY17. The £9.6m management fees included c £1.2m of one-off performance and mandate success fees. When the funds deliver cash returns to its fund investors, the group may also benefit from performance fees and/or house carried interest and Mercia has benefited from two fund distributions in FY18. Altogether, the funds have performed well, with the first fund RSGF having returned 4-5x to investors since inception 15 years ago. Fee rates for funds are typically 2% and two of the funds (RSGF and CGF) are paying carried interest and a third fund (EVGF) looks likely to join shortly. The hurdle rates for carried interest are typically 6-9% per year after initial commitments are repaid.

Within the Funds, Mercia has co-invested with other experienced UK funds including North Edge, Capital E, Maven, significant international industrial co-investors such as the venture arms of Honda, Solvay, Halde Topsoe and JLR. Within early-stage third-party venture funds, failure rates run at c 40-50%, which management expects to remain constant. We note that although the majority of failure risk is under the FuM umbrella, there have been a few downward fair value movements in the balance sheet portfolio also (Concepta, Smart Antenna Technologies, Soccer Manager and Edge Case Games). To date, there have been no business failures within the top 20 companies.

Exhibit 2: Selected MFM funds

Fund	Original size (£m)	Highlights
Rising Stars Growth Fund	19.0	This fund contains Blue Prism and is MFM's oldest (15 years). The £19m fund has returned 4–5x to investors and still has a portfolio value of £25m
EVGF	15.5	Regional growth and development fund performing well and is expected to pay carried interest soon
Coalfields Enterprise and Coalfields Growth Funds	20.0	Government-sponsored funds aimed at rejuvenating heavily deprived areas that were only able to invest in areas of the UK that were formerly UK coalmining areas. CGF is performing well and paying carried interest
FY Seedcorn and South Yorkshire Seed Fund	25.0	Heavily restricted geographically to parts of Yorkshire, which has only recently become known for hi-tech activity
NW Venture Fund	30.0	Restricted, unable to transact biomedical, energy related or digital and creative deals.
NPIF Northern Powerhouse	108.5	£60m equity and £50m debt covering Yorkshire, Tees Valley and North West. The fund is now 18 months into its five-year investment phase. Appointed by British Business Bank (BBB)
MEIF Midlands Engine	23.0	BBB mandate received in 2018. POC equity covering Midlands from Oxford upwards
North East Venture Fund	28.0	BBB mandate received in 2018. Covers Newcastle and Tyne
EIS and SEIS	39.0	Funding for early-stage businesses in tax efficient vehicles

Source: Mercia Technologies

Valuation: MFM not reflected in NAV calculation

Over the past decade, the IP commercialisation (IPC) sector has become significantly more established and until 2016, it generally traded at a significant premium to NAV. Similar to many of its peers, Mercia's premium to NAV peaked in 2015, with investors clearly anticipating healthy IRRs across the sector.

From 2017, however, sector sentiment has turned more negative and, similar to many of its peers, Mercia's share price has fallen by c 40% since 2017. The stock currently trades at 0.73x NAV, which is below the peer group average of 0.99x and lower than IP Group at 0.78x NAV, Syncona at 1.38x and Draper Esprit at 1.68x.

As we detail further in the valuation section, the NAV calculation does not include the revenues and profits generated from the successful and growing £400m FuM business. The listed fund management peer group trades at 3.5x EV/sales and 11.7x P/E for the current year and we apply a 15% discount for MFM (given relative maturity and size), leading to a 3x EV/sales and 10x P/E for FY19. Blended together, these multiples suggest a total value for MFM of approximately £27m or c 9p per share. If we added this value into the NAV calculation, the shares would actually be trading at 0.60x NAV.

Altogether, catalysts for a re-rating would include meaningful commercialisation of the direct investments and/or further successful revaluations or exits. Although it is clearly impossible to guess the timing of an exit, we believe that any of nDreams, Intelligent Positioning, Oxford Genetics or Impression Technologies are the most likely to achieve a liquidity event in the next two or three years.

Evergreen hybrid model

Mercia strategy

Mercia is half way through its seven-year strategic plan to create a sustainable evergreen national investment business focused on sourcing regional deal flow, nurtured through its FuM before Emerging Stars are selectively brought onto the balance sheet. The intent for both Mercia's FuM and balance sheet is the establishment of a diversified portfolio yielding a consistent flow of cash returns.

Mercia believes that the average age of a trade sale for a high-growth business in the UK is 13.5 years, for an IPO it is 10 years and typically, three out of four venture-backed businesses fail to

provide a profitable return of capital. The transition from seed to growth occurs on average six years from initial seed investment and in less than 6% of the seed investments.

MFM nurtures early-stage businesses and de-risks business model

At FY18 MFM had c £400m FuM, which range from debt, venture and growth capital. Typically, MFM nurtures young businesses in its funds for six months to seven years before it selects Emerging Stars to bring across onto the group balance sheet. During FY18, FuM grew from £336m to c £400m. This includes £230m cash, which MFM will invest for building a high quality pipeline for the future.

MFM receives a high volume of investment opportunities each year, enabling the investment teams to be highly selective. In FY18, of the c 2,000 enquiries that were received for equity investment the teams invested c 5% into the FuM, growing the managed funds venture portfolio to 174 companies, of which only three (1.7%) became new Emerging Stars on the balance sheet. This means that less than 0.2% of enquiries ended up as balance sheet investments, demonstrating the highly vigorous process the portfolio companies go through before being backed by shareholder capital.

The key factors in selecting the Emerging Stars are fit within Mercia's areas of expertise and experience, the need for modest capital requirements, quality of management, commercial opportunities and clarity of focus in terms of milestones that need to be achieved. The three successful Emerging Stars in FY18 were Voxpopme (six months in the funds), Aston Eyetech (three years in the funds) and Intechnica (four years in the funds). In our profiles of some of the portfolio businesses, we provide a more detailed analysis of investment criteria for the different sub-sectors.

As we detail in the Financials section, an additional upside to using managed funds are the fund management fees generated. In FY18, fund management-related fees were approximately £9.6m, which largely offset the operating costs of the entire business.

Only the most promising companies receive balance sheet investment

Once companies are on the balance sheet, Mercia continues to selectively invest to scale the individual businesses and the Group concentrates on building its own stakes up to 20-40% in many of its balance sheet assets, ahead of co-investment events that should uplift value. Mercia is well capitalised, with unrestricted cash of £49.4m cash at FY18, enabling it to support its existing direct investments as well as invest in new Emerging Stars.

As detailed on page 10, Mercia currently has balance sheet investments of £66.1m, of which 99% are in the top 20 businesses. The group focuses on some of the highest growth sectors in the UK, leveraging deep expertise across a number of areas:

- Software and the internet: AI, cybersecurity, SaaS, analytical tools, adtech
- Digital and digital entertainment: VR, augmented reality, gaming/content, serious games
- Electronics, materials, manufacturing/ engineering: energy, communications, high value electronics, manufacturing applications
- Life sciences and biosciences: Diagnostics, digital health, medical devices, synthetic biology

Three successful exits to date

The business model is predicated on the assumption that only a small minority of premium exits will drive overall investment returns and the ultimate proof of the investment thesis lies in the successful exits achieved to date. Mercia has an encouraging track record regarding exits, with recent sales of Allinea (c £1.0m realised gain) and Science Warehouse (£0.6m realised gain).

Similar to other IP commercialisation companies, Mercia does not have the fixed-term investment period of classic VCs or closed-end funds. Instead, it reinvests proceeds back into balance sheet investments and new Emerging Stars. By investing from its own balance sheet, Mercia is not under

pressure to return capital to shareholders within a specific period, thus enabling further growth and nurturing of its portfolio businesses. The group's continued focus is on realising cash from fund and direct investments as it continues to build an evergreen hybrid model.

An extensive regional network, with limited competition

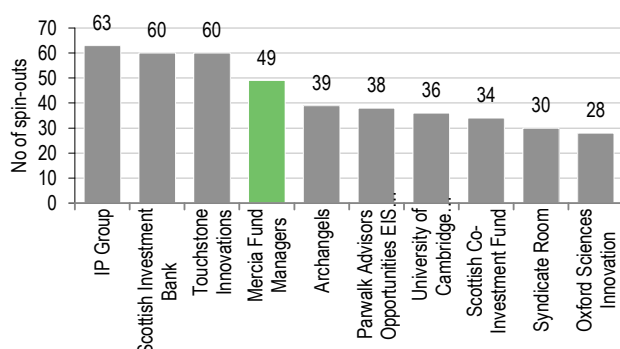
Mercia's 19 university partnerships provide it with the largest number of university partnerships compared to peers and access to an expanding portfolio of businesses addressing global markets within its managed funds. Many of the UK's leading universities are located in the regions and there is a continuing development of technology clusters across the UK regions (eg Birmingham, Edinburgh and Manchester).

As shown in Exhibits 3 and 4 below, Mercia Fund Managers is one of the UK's most active investors in UK university spinouts, and also by number of fund-raising overall. According to Beauhurst, MFM has participated in 141 announced fund-raising across 83 companies, investing a total of £148m with an average fund-raising size of £1.08m. This compares to the average stake taken by investors in these deals of 24.1% at a £2.82m pre-money valuation.

Mercia has numerous ways to access deal flow through its nine offices, 80 staff and 19 university partnerships. University partnerships account for c 25% of FuM investment activity. Other pipeline sources include the NHS Feeder Fund, regional incubators' programmes, regional advisors, personal networks and direct enquiries. Altogether this amounts to a deal flow ecosystem which is unmatched across the Midlands, the north of England and Scotland combined.

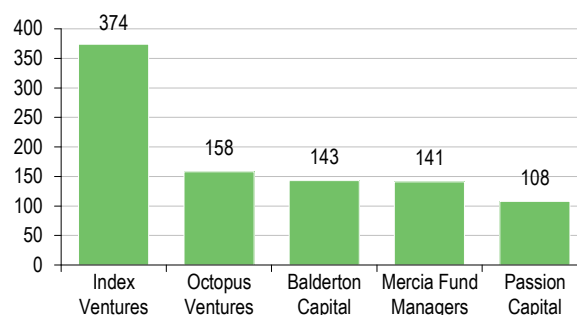
In terms of raising funds, MFM leverages its bank networks very effectively. For example, MFM was appointed by the British Business Bank to manage funds in both the Northern Powerhouse Investment Fund and the Midlands Engine Investment Fund regions, as well as the North East Fund appointed by The North East Fund Limited.

Exhibit 3: 10 most active overall investors of UK spin-outs since 2011



Source: Beauhurst

Exhibit 4: Five most active UK venture capital funds by number of fundraisings



Source: Beauhurst

Key management

Members of Mercia's core investment team have worked together for many years and in the industry for decades and have had considerable success – notably CIO Julian Viggars, who was the investment director for the fund investment of Blue Prism leading up to the 2016 IPO.

Within the portfolio businesses, the management teams and NEDs are sector experts, including Warwick Acoustics non-executive director Gary Waters (formerly general manager at BOSE) and Medherant's chairman Ken Cunningham (formerly CEO of Skyepharma).

Remuneration is reflective of the group's relatively early stage in its growth trajectory, with management incentives aligned with the group's strategic objectives. It is specifically focused on

the successful syndicated investment in and subsequent exit from the portfolio businesses. The main elements are base salary, bonuses, an LTIP plan and a 10% carried interest plan. All of the executives are shareholders and the Board and executive team hold approximately 24% of the outstanding share capital in Mercia.

Exhibit 5: Board and management team

Name	Role	Background
Dr Mark Payton	CEO/co-founder	Extensive venture investment experience. Led the sale of Hybrid Systems to create PsiOxus Therapeutics, Warwick Effect Polymers to create Abzena and led the founding investment in Allinea Software. Leading role in Oxford University Innovation.
Martin Glanfield	CFO	KPMG qualified chartered accountant with more than 20 years' experience as CFO of listed, private equity backed and privately owned technology-led businesses.
Julian Viggars	CIO	Joined Mercia through the 2016 acquisition of Enterprise Ventures, which he joined in 2004 and was head of technology investments. He has over 20 years of venture capital experience, including the successful listing of Blue Prism and Xeros Technology Group and Optibiotix.
Susan Searle	No-exec chairman	Previously CEO of Imperial Innovations Group from 2002-2013, where she led funding rounds of c £250m. Prior roles at Montech (Australia), Signet Group, Bank of Nova Scotia and Shell Chemicals. NED of four other public companies, including chair of WPCT.
Ian Metcalfe	Senior independent director	Formerly managing and corporate partner of international law firm Wragge & Co, acting for a number of substantial public and private companies.
Ray Chamberlain	Non-executive director/co-founder	Previously non-executive chair at Mercia at IPO and formerly executive chairman of Forward Group.
Dr Jonathan Pell	Non-executive director	Senior finance positions at Convergys Corporation, Geneva Technology, Thomas Cook Retail and Semitool. CEO at Datanomic.
Caroline Plumb	Non-executive director	Co-founder of Freshminds consultancy, CEO of Fluidly. Serves as one of the UK prime minister's business ambassadors.

Source: Company accounts

Current portfolio summary

Mercia focuses its investments in the UK regions where it is able to source compelling investment opportunities driven by a historic undersupply of capital. At FY18, Mercia's balance sheet investments amounted to £66.1m, including the addition of three new Emerging Stars from MFM. As a result of the expanding FuM and subsequent investment into early-stage businesses, there is a continuously growing pipeline of potential Emerging Stars, which should result in an increased number of direct investments.

The group invests across a wide variety of sectors, concentrating on scalable business models with potentially disruptive technologies. Companies are divided into four sectors: 1) software and the internet; 2) digital and digital entertainment; 3) electronics, materials, manufacturing/engineering; and 4) life sciences and biosciences.

We list the top 20 assets in Exhibit 6 below, which now comprise over 99% of the total portfolio value and, to provide more detail on the quality of the investments, we have profiled some of the key investments on pages 12–39. In summary, they are:

- **nDreams** is a developer and publisher of virtual reality (VR) content and is the largest company in the direct investment portfolio with a fair value of £13m or 19.6% of the total portfolio value. After years enduring a market where the 'reality' significantly lagged the hype, the business is now growing rapidly. FY15-18 delivered a 50%+ revenue CAGR and management expects similar growth in FY19e. Much of its activities are covered by tight NDA agreements but a roster of award wins and relationships with the likes of Google and Microsoft Studios testifies to the strength of its development team. Increasing public visibility on its "industry-leading" projects and the launch of high performance wireless VR headsets could prove further positive catalysts over the next 12 months. To date, c £7m of capital from Mercia has been invested in the business, which as of March 2018 had a carrying value of £13.0m. Mercia holds a 45.6% stake in the business and we believe there is a high likelihood of a valuation uplift in the next two years.
- **Impression Technologies** is Mercia's second largest holding in the EMME sector, with a fair value at FY18 of £3.1m, or 4.7% of the total portfolio value. It boasts a potentially disruptive technology (innovative patented technique for hot-forming high-strength aluminium that can be used as a cost-effective replacement for high-strength steel or mild aluminium in light-weighting projects). The product is already in demand due to the push to light-weighting in automotive industry to cut emissions by improving fuel efficiency and for electric vehicles as it improves range. The company is already achieving commercial revenues by manufacturing parts for several UK luxury cars. Longer term, it is hoping to generate licensing, royalty revenues from a market that could potentially be worth \$100bn per year. Management's view of potential exit strategies is either a trade sale to a press manufacturer over the next two years, or an IPO once significant revenues have been achieved.
- **Oxford Genetics (OG)** is Mercia's largest healthcare holding (£9.1m net investment value as of 31 March 2018), representing 13.8% of the total portfolio value (Mercia's second largest overall portfolio investment). OG is focused on the development of viral, gene editing and protein therapeutic technologies which it sells in off-the-shelf or custom variants. These offerings enable it to pursue a multi-stream revenue model coming from licences and fees as a result of both catalogue sales and custom services. In August 2017, OG raised £7.5m (from Mercia and Invesco) to fund ongoing operations and new facilities in the US and the UK.
- **Intelligent Positioning** is Mercia's largest software holding (with a fair value of £4.2m or 6.3% of the total portfolio value). Its software platform combines search ranking data, market intelligence and analysis of large datasets, to inform business critical decision making. It has over 80, largely blue chip, customers generating high margin, recurring revenues that the

company indicates are currently growing by 30-40% y-o-y. The business is fully funded to reach breakeven in early 2019 but has several opportunities to accelerate its rapid growth.

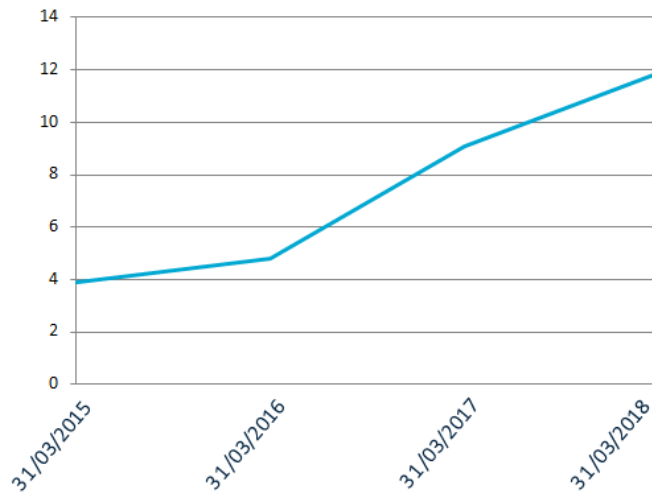
Exhibit 6: Direct investment portfolio

£000	Sector*	Net value FY17	Net cash invested in FY18	Investment realisation	Fair value change	Net value FY18	% held at FY18
Company							
nDreams	Digital/ digital entertainment	10,979	2,000		0	12,979	45.6
Oxford Genetics	Life sciences/ biosciences	2,196	2,500		4,394	9,090	40.6
Warwick Acoustics	EMME	2,791	1,800		1,561	6,152	64.0
Ton UK t/a Intelligent Positioning	Software and the Internet	2,500	500		1,216	4,216	28.8
Intechnica	Software and the Internet	0	3,750		271	4,021	27.9
Medherant	Life sciences/ biosciences	650	2,500		303	3,453	31.9
Impression Technologies	EMME	1,500	1,520		87	3,107	26.6
VirtTrade	Digital/ digital entertainment	1,538	1,000		0	2,538	28.4
PsiOxus Therapeutics	Life Sciences/ Biosciences	2,377	0		0	2,377	1.5
Smart Antenna Technologies	EMME	2,259	450		(561)	2,148	28.0
Edge Case Games	Digital/ digital entertainment	2,310	1,500		(1,810)	2,000	21.2
The Native Antigen Company	Life sciences/ biosciences	1,141	23		778	1,942	32.7
LM Technologies	EMME	1,770	100		43	1,913	41.4
Aston EyeTech	Life sciences/ biosciences	0	1,750		0	1,750	18.7
Crowd Reactive	Software and the Internet	1,500	150		0	1,650	28.3
sureCore	EMME	1,500	0		0	1,500	23.0
Concepta	Life sciences/ biosciences	3,400	365		(2,459)	1,306	18.2
Faradion	EMME	1,299	0		0	1,299	13.6
Soccer Manager	Digital/ digital entertainment	1,599	0		(400)	1,199	31.6
Voxpopme	Software and the Internet	0	1,000		0	1,000	12.3
Science Warehouse	Software and the Internet	9,913	0	(9,913)	0	0	0.0
Other direct investments		806	224		(600)	430	N/A
Total		52,028	21,132	(9,913)	2,823	66,070	N/A

Source: Mercia Technologies. Note* EMME is electronics, materials, manufacturing/engineering

Changes in fair value

Since the IPO in 2014, the balance sheet portfolio value has increased from £9.0m to £66.1m, with net investments of £45.2m and a net fair value growth of £11.9m. We note that during FY18, fair value adjustments in the year were affected by negative contributions from both Concepta and Edge Case Games, where the businesses had fallen behind plan. However, this was offset by the significant uplift from Oxford Genetics, which completed a £7.5m funding round led by Invesco. Including annual net fair value movements and realisations, the balance sheet has an IRR of c 15%.

Exhibit 7: Cumulative fair value net gains for direct investments (£m)


Source: Mercia Technologies

As these balance sheet investments mature, it is expected that syndicated rounds with third parties at higher valuations will occur which will in turn lead to increasing NAV. Mercia concentrates on building its own stakes up to 20-40% in many of its balance sheet assets, ahead of co-investment events that should uplift value. Co-investors to date include IP Group, Invesco, SROne, Lundbeckfonden, Woodford Investment Management, Oxford Capital Partners and Capital E. In addition, the group has also co-invested with Chinese corporates and significant Family Offices.

In the next section we profile some of Mercia's key investments.

Digital & digital entertainment

Analyst: Dan Gardiner

As of 31 March 2018, the value of Mercia's investment in its Digital portfolio was £18.7m. Digital is its second-largest sector, representing 28.3% of its total portfolio value, and is its most concentrated: £13m (70%) of the value is accounted for by its 45.6% stake in virtual reality content provider nDreams (profiled below). Aside from nDreams the company has three investments in this sector valued at over £1m: VirtTrade (£2.5m), Edge Case Games (£2.0m) and Soccer Manager (£1.2m). All together, these four investments account for nearly all of the stated Digital portfolio value. Mercia invested £4.5m in Digital in FY18 – £2m in nDreams, £1m in VirtTrade and £1.5m in Edge Case Games.

The Digital portfolio is managed by Mike Hayes (profiled below). The stated focus of the portfolio includes gaming, virtual, mixed and augmented realities, middleware and trading platforms. Mike aims to channel his expertise (30 years' experience at companies including Nintendo and SEGA) to mentor innovative businesses within these areas and build a strong portfolio.

nDreams

Overview: Rapidly growing VR content company

nDreams is a developer and publisher of virtual reality (VR) content. After years enduring a market where the 'reality' significantly lagged behind the hype, the business is now growing rapidly. FY16-18 delivered a 50%+ revenue CAGR and management expects similar growth in FY19. Much of its activities are covered by tight NDA agreements but a roster of award wins and relationships with the likes of Sony, Oculus, Google and Microsoft Studios testifies to the strength of its development team. Increasing public visibility on its "industry-leading" projects and the launch of high performance wireless VR headsets could prove further positive catalysts over the next 12 months. To date, Mercia has invested c £7m in the business. As of March 2018, its 45.6% stake was valued at £13m and the total business at £26m.

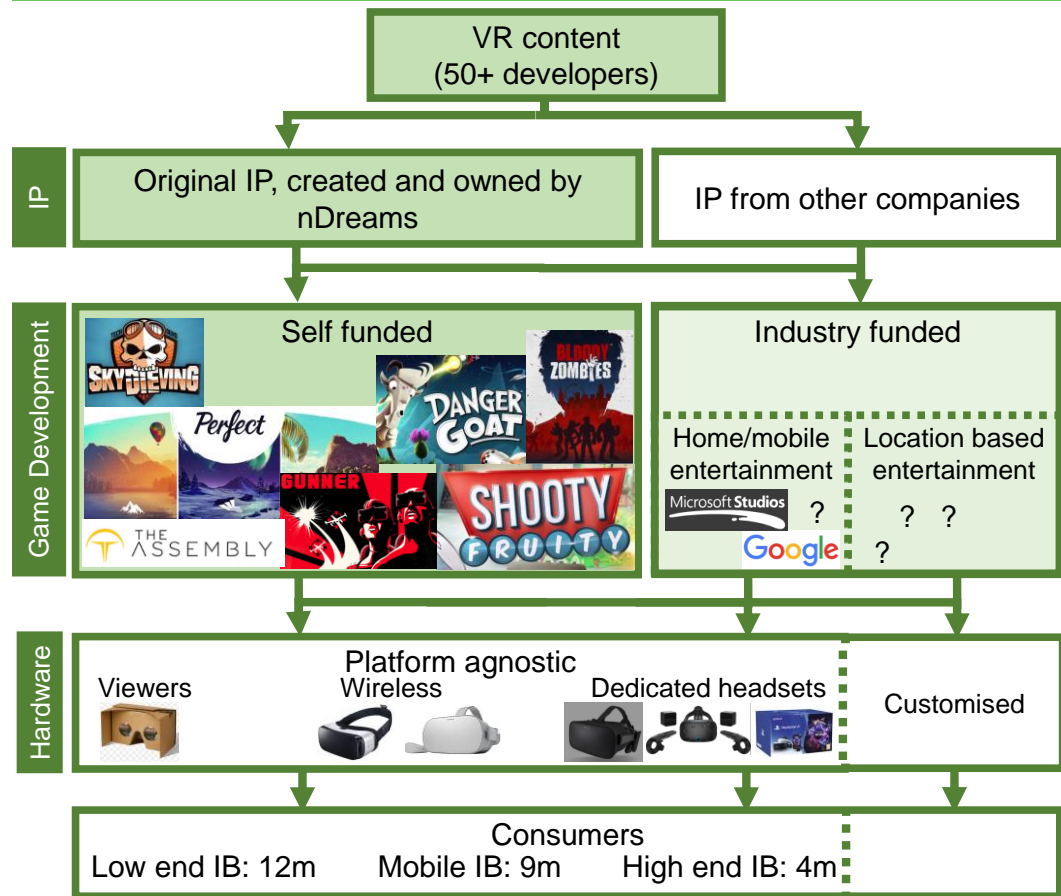
Background and description

nDreams was founded by Patrick O'Luanaigh in 2006. Following an investment from Mercia's managed funds it shifted to focus exclusively on VR in 2013 after its 'SkyDIEving' demo designed for the Oculus development platform received rave reviews.

- 2014: Announced the planned title "The Assembly" at video game conference E3 in June.
- 2015: Launched its first commercial titles: "Gunner" an alien 'shoot em up' and VR experience "Perfect Beach". Both targeted the Samsung Gear VR headset released in November that year. Mercia classes nDreams as an Emerging Star.
- 2016: Launched the adventure game The Assembly and Perfect for PC/console-connected VR headsets (HTC Vive, Oculus Rift, PlayStation VR) released in the same year. The company also collaborated with Google on its Daydream VR platform for Android, including being on-stage for the launch announcement at Google I/O in May and releasing "Danger Goat" for the commercial release in November.
- 2017: Launched the multi-player 'brawler' game, "Bloody Zombies" and "Shooty Fruity", a multi-tasking VR 'shooter' game that became Metacritic's highest-rated PlayStation VR shooter. Began work on custom projects for game developers and arcade entertainment providers. Raised £2.7m in further investment in July, including a further £2m from Mercia.
- 2018: Announced a "multi-million dollar contract with a...global technology firm" in August.

The small installed base of headset owners means mainstream game developers struggle to justify substantial investment in dedicated VR content currently. Thus nDreams believes that, despite its smaller size, it is already one of the leading developers globally. Its team of 50+ developers are increasingly focused on dedicated high-end VR platforms such as HTC Vive, Sony PlayStation VR and Oculus which deliver the best user experience. We see three main channels to market for nDreams's VR content currently:

1. **Developing its own 'IP' and incorporating it within its own games.** nDreams has had both critical and commercial success across a number of different genres from adventure games (The Assembly), to experiences (Perfect series), 'shoot em ups' (Shooty Fruity) and multiplayer titles (Bloody Zombies). Retailing for between £15 and £30, nDreams promotes and sells the games directly but also has distribution relationships with third-party platforms such as PlayStation VR, Oculus Home, Steam and Green Man. These platforms typically take c 30% of the sale price.
2. **Working with major VR and game companies.** In some cases nDreams is commissioned to produce VR content for third-party games or platforms, either using its IP or converting that owned by the customer. In cases where the customer uses nDreams's IP, nDreams will typically retain ownership rights and will receive a share of sales on top of the project revenue. As these customer relationships are typically covered by tight NDAs the company cannot publicly discuss the details of this work but has worked with Microsoft Studios (Windows Mixed Reality Headsets) and Google (Daydream) in the past and Mercia's recent RNS disclosed a "multi-million dollar contract with a global technology firm." We would expect further details about this contract to emerge over the next six months.
3. **Working with entertainment companies to provide 'location based' VR experiences.** Many consumers looking to experience VR for the first time opt to try a dedicated venue or arcade. These venues provide a very high quality experience without the need to spend money on expensive headsets. nDreams provides VR content to these venues, either directly or via content management players. Again, strict NDAs prevent nDreams disclosing more about its activities here, but we would expect further details to emerge over the next six months.

Exhibit 8: nDreams's major activities and routes to market


Source: nDreams, Edison Investment Research

Management team and shareholders

Patrick O’Luanaigh, founder and CEO: Prior to founding nDreams in 2006, Patrick was creative director of Eidos/SCi, where he was responsible for design, gameplay and overall quality on all titles including Tomb Raider Legend, Hitman Blood Money, Just Cause and Conflict: Desert Storm. Before Eidos/SCi he was head of external development and acquisitions at Codemasters where he produced titles such as the Music/MTV series and Operation Flashpoint.

Tom Gillo, VP development: Tom joined nDreams in November 2015 having previously worked at Sony Entertainment Europe where he was executive producer and game director. He was also executive producer at Codemasters between 2008 and 2010.

David Corless, VP publishing: David joined nDreams in 2014 from SEGA where he was global brand director for Sonic the Hedgehog. Prior to this, he held head of marketing positions at both SEGA and Capcom.

Mike Hayes, head of digital & digital entertainment, Mercia: Mike oversees Mercia’s stake in nDreams as part of its digital & digital entertainment portfolio. With over 30 years’ experience in digital entertainment, he has worked at Nintendo, Codemasters and SEGA. At SEGA, he was CEO for Europe and America presiding over business generating over £400m in sales annually. Mike introduced nDreams to Mercia, an example of both the strength and importance of relationships in the sector.

Remaining shareholders. After Mercia and Patrick there is an option pool representing c 10% of the current outstanding shares for senior management and staff. The remaining shares are held by Mercia Fund Managers (5.4%) and various Angel investors.

VR – primed for inflection?

A VR headset displays a computer generated three dimensional simulation of an environment. Motion sensors or camera tracking detect changes in the direction and position of the headset and the images are adjusted accordingly. The sensation of an environment that surrounds the wearer creates a much more immersive experience. Using linked handheld controllers and wearable sensors, the wearer can interact within this virtual environment.

Game enthusiasts and early adopters have long seen VR as a technology on the cusp of going mainstream. Facebook's \$2bn acquisition of (two year old start-up) headset developer Oculus in 2014 sparked a resurgence of investment. Google's Cardboard, launched in early 2015, was a low-cost viewer for smartphones designed to stimulate consumer interest (estimated installed base of [12m](#)). In late 2015, Samsung launched its own headset (Gear VR) that enabled its smartphones to act as a VR device. In early 2016 Oculus launched Rift, a \$600 headset connected to a PC via a cable that used a constellation of fixed sensors placed around the user to track positioning. HTC's Vive, a similar system but priced at \$799, was launched around the same time. In October 2016 Sony released its PlayStation VR platform designed to integrate with its home console, PlayStation4.

HTC and Samsung initially cross-promoted VR headsets with their smartphones. As these promotions were withdrawn, sales of the headsets began to decline. Smartphone-based VR in particular was seen to offer a disappointing performance: processors optimised for low power consumption were unable to render detailed dual images rapidly. Latency led to a poor experience and in some cases induced nausea. Connecting with third-party controllers was clunky and consequently users struggled to interact easily in the VR environments. PC/console-connected devices created a richer, much more impressive, user experience but were both complex to set up and expensive. Simply put, initial VR hardware was either not good enough or too expensive.

Chicken and egg?

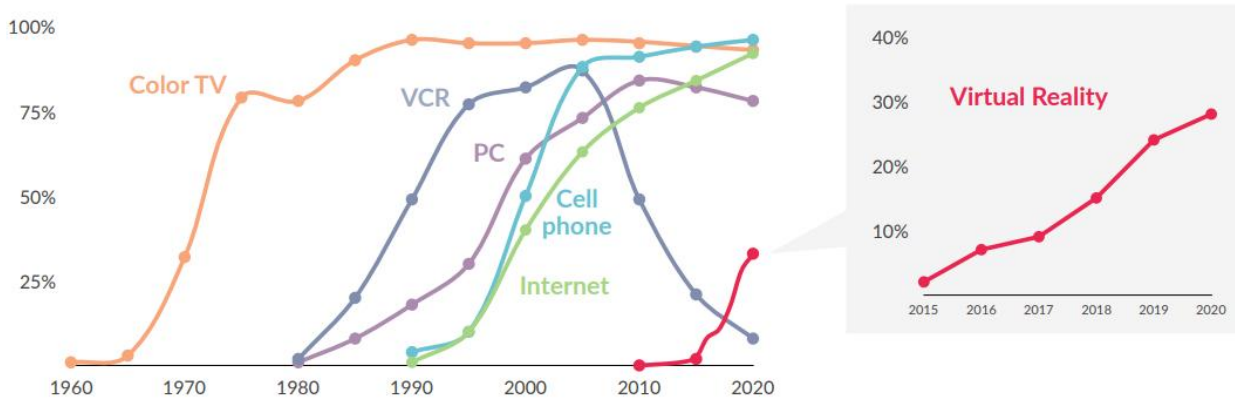
A further fundamental issue governing the pace of adoption is the chicken and egg relationship between VR hardware and content. nDreams estimates that only [c 25m VR headsets](#) have been purchased in total and only 4m of these are 'high end' PC/console-connected. This compares to an active console installed base of over 110m and over 1bn PC users. With such a small installed base, mainstream game publishers are reluctant to invest substantial amounts developing specific content or even converting triple AAA titles into VR. Yet without compelling, dedicated VR content there is no incentive to pay for expensive hardware.

Improved hardware, at lower cost set to ramp up adoption

Nevertheless, we see a bright future for VR. The immersive experience delivered by high-end headsets is truly impressive and will only get better and cheaper over time as the hardware improves. In September 2018 Oculus announced details of its Quest product (formerly "Santa Cruz") that it intends to launch in "spring" 2019 for a \$399 price tag. A fully wireless device with location and controller tracking, the Quest aims to be the first headset to bring near PC/console-level performance to a wireless device. nDreams believes that removing both the wired connection and the need for external sensors is crucial for mainstream adoption. It has long been discussed in the press that Apple is working on a VR headset. In smartphones, tablets and smartwatches, Apple's entry into the market has proved to be a catalyst for wider adoption.

Other initiatives should drive VR adoption over time. Venues offering VR activities and events will help broaden awareness of a technology that has to be experienced to be fully appreciated. Broadcasters are already looking at the potential (and bandwidth implications) of VR content. Ever more sophisticated haptic sensors (simulation of touch and textures via the application of forces or vibrations) will improve interaction.

Exhibit 9: Adoption curves of consumer technology in US households and VR forecast



Source: Michael Felton, NY Times, Pew Research Center; Gallup, US Census, SuperData Research

Recent years have seen no shortages of forecasts predicting VR adoption reaching an inflection point similar to other consumer technologies (see Exhibit 9). Market intelligence firm, IDC believes the market will grow tenfold between 2018 and 2022. Whether the Quest or Apple hardware ultimately prove to be catalysts for mainstream adoption is hard to say (initial [reviews](#) of the Quest headset highlight performance compromises relative to the Rift) but arguably nDreams does not need such an inflection to prosper. VR is still growing. Sony (the only headset manufacturer disclosing units that did not cross-promote sales in 2017) sold 2m PlayStation VR units in its first year. By August 2018 (nine months later), sales had grown to 3m, implying a further 1m units in nine months with the Christmas period still to come. More importantly, the number of games sold had nearly doubled to 22m. nDreams is already delivering 50%+ growth in revenues even without a significant acceleration in market adoption.

Key capabilities and areas of differentiation

By focusing exclusively on VR for over five years nDreams has built up a deep understanding of what content works best and how to solve specific problems. Many of these insights are not intuitive to game developers working in traditional 2D environments. Seemingly small issues such as how and where to display a user interface such as score information can have a disproportionately large impact on user experience. nDreams understands how to use VR in different genres to enhance the user experience.

One of the key differentiators in VR is the level of interaction (agency) a player has. Where a user not only moves through the 3D environment but also interacts with it, immersion is enhanced still further. Examples of this range from greater levels of empathy (or horror) towards characters and events, to the feeling of vertigo a player experiences if exposed to significant heights. It is here where nDreams believes its deep experience of VR gives it an edge. In Shooty Fruity, a player inhabits the role of a checkout assistant scanning groceries while fending off rampaging mutant fruit with an increasingly over-the-top arsenal of weapons. Switching between the two tasks and interacting with the products provides both the fun and the challenge. The game was shortlisted for Game of the Year by both VR Award and TIGA Award and received the highest ever rating for a VR shooter game on Meta-critic. Both the creation of the concept and the development would not have been possible without the deep understanding of VR content.

At the heart of this deep understanding of VR is nDreams's development team. Currently more than 50-strong it has experience of working on multiple AAA titles such as Assassins Creed, Tomb Raider and Harry Potter with companies across the industry including SONY, Rockstar Studios, SEGA, Microsoft Studios and EA. It is this experience and its relationships with major game studios that informs nDreams's strategic direction. Already one of the largest development teams exclusively focused on VR, plans to double the team over the next 12 months should enhance its competitive strength further.

Finally, nDreams's VR work is widely recognised in the industry. We would expect further details to emerge over the next six months about its upcoming projects, but the company has disclosed it has worked with SONY, Oculus, Microsoft Studios and Google in the past. Danger Goat was a launch title for Google Daydream platform and nDreams appeared on stage at Google I/O. The company has also picked up numerous awards. Aside from the success of Shooty Fruity, The Assembly won the award for "Most Original Game" and was shortlisted for Creative Gameplay at the 2016 [TIGA Awards](#). Bloody Zombies won VR Game of the Year at E3 in 2017.

Potential risks

Probably the biggest issue facing the company currently is meeting its hiring strategy, as it plans to nearly double its developer base over the next year. VR is seen to be an exciting growth market that developers are keen to move into but finding the experienced staff to fill these vacancies is both time consuming and costly. nDreams incentivises its staff with a combination of options and a culture that strongly emphasises a healthy work/life balance. Its ability to preserve the quality of its development team without overpaying is likely to have a big influence on long-term prospects in our view.

Revenue visibility is another key issue. Predicting the commercial success of new games is notoriously hard. Large, mainstream listed gaming companies address this by having a diverse portfolio, increasingly adopting 'game as a service' models, and concentrating investment on successful franchises with annual/biannual releases. However, this approach often leads to a risk adverse approach and a reluctance to fund investment in new games. While working with major technology companies substantially improves visibility for nDreams, VR is a rapidly evolving market. Innovation and risk taking will be needed to flourish over the long term in our view and this is likely to impact visibility. This is an area where Mercia's 'patient capital' approach directly benefits the company.

Perhaps paradoxically, rapid take off in VR could prove problematic for nDreams. Thus far it has largely benefitted from the reluctance of the mainstream industry to fund VR development. A positive catalyst that triggered a surge in investment could increase competition or might make it difficult for nDreams to retain and attract skilled employees. Such a scenario is likely to have important benefits of course. A larger installed base of VR hardware increases the size of the addressable market and the company may become more attractive to external investors.

What could success look like and how could it be valued?

Given limited disclosure and the early stage of development it is not possible to forecast or value nDreams currently. Nevertheless, we can draw together a picture of what could be achievable if the company can execute on the VR opportunity based on management commentary and the performance of more mature, listed UK peers.

The company has delivered a revenue CAGR of 50%+ over the past three years and expects this trend to continue in FY19e. We understand that existing contracts provide good visibility of revenues in FY20e. To support these contracts, management plans to nearly double headcount and believes the revenue generated by both existing and new contracts currently in negotiation should fully cover the costs. nDreams believes these contracted revenues, combined with volume sales

from its games, should be sufficient to reach profitability in FY20e. Beyond FY20e, visibility is currently more limited – the typical game lifecycle is 18 months – but the company is hoping to be sustainably cash-generative at this point. It believes the projects it is currently involved with could potentially become multi-year franchises generating repeat business.

If the VR market continues to grow, nDreams believes it should be capable of sustaining its current growth trajectory over a long period. This would make it attractive vs its peer group in our view. UK listed gaming peers currently generate average revenue growth of 30% (including any inorganic growth) and EBIT margins of 17%.

Mercia's £13m valuation of its 45.6% stake implies a £26m (\$34m) EV. Listed gaming stocks are typically highly rated: UK listed gaming peers trade at an average FY2 EV/EBITDA multiple of 18–20x and a P/E of 35–40x. It is possible that a listed VR-focused stock, particularly one with recurring revenue elements, could trade at a higher multiple.

Alternatively, there is a potential trade sale exit. Keywords Studios, a supplier of services to the gaming industry, has made multiple acquisitions of private gaming companies over the last few years at multiples ranging from 7–10x trailing PBT for smaller names to 13x for larger studios (eg VMC). However, many of these companies provided lower value-add services such as language localisation, customer support and testing as opposed to the actual development of the games. In our opinion, an acquirer would value the industry leading talent developed at nDreams. Given this and the attractive growth prospects of the market it is addressing, it is difficult to see why nDreams would accept a large discount to listed ratings.

Life sciences & biosciences holdings

Analysts: Dr Daniel Wilkinson and Dr Sean Conroy

As of 31 March 2018, life sciences and biosciences (LSBS) holdings were valued at £19.9m (30.1% of total portfolio value), making it the largest sector in Mercia's portfolio. Led by Peter Dines (who is also the chief operating officer and has over 20 years' operational experience in the sector), Mercia is invested in 28 LSBS companies split into 22 investments through its Mercia Fund Managers and six direct investments (Exhibit 10). Mercia's LSBS investment philosophy aims to limit exposure to capital intensive, high risk therapeutic companies (where success or failure is often determined by binary clinical trial readouts) and focus on areas within healthcare where smaller investments can drive value. As such, investments to date have been focused predominately on companies operating in diagnostics, digital health, medical devices and synthetic biology. We note that while this is Mercia's broad strategy for LSBS investments, it still retains one direct investment in PsiOxus Therapeutics, a biotechnology company developing gene therapies for solid tumours (£2.4m net investment value as of 31 March 2018).

In FY17/18, Mercia invested £7.1m in its direct LSBS holdings, with notable investments in Oxford Genetics (£2.5m), Medherant (£2.5m) and Eyoto (£1.75m).

Exhibit 10: Direct life sciences and biosciences holdings

Company	Net investment value at 1 April 2017 (£000)	Net cash invested year to 31 March 2018 (£000)	Fair value movement year to 31 March 2018 (£000)	Net investment value 31 March 2018 (£000)	% of capital held at 31 March 2018
Oxford Genetics	2,196	2,500	4,394	9,090	40.6%
Medherant	650	2,500	303	3,453	31.9%
PsiOxus Therapeutics	2,377	0	0	2,377	1.5%
The Native Antigen Company	1,141	23	778	1,942	32.7%
Eyoto (Aston EyeTech)	0	1,750	0	1,750	18.7%
Concepta	3,400	365	(2,459)	1,306	18.2%

Source: Mercia Technologies, Edison Investment Research

Oxford Genetics (OG) is currently Mercia's largest healthcare holding (£9.09m net investment value as of 31 March 2018), representing 45.7% of the sector and 13.8% of the total portfolio value (Mercia's second largest overall portfolio investment). OG is focused on the development of viral (adeno associated virus, lentiviral, adenoviral, vaccine), gene editing (CRISPR) and protein therapeutic (antibodies) technologies which it sells in off-the-shelf or custom variants. Revenues are generated from the downstream licensing of technologies and the sale of products (custom contracts or off-the-shelf). In August 2017, OG raised £7.5m (from Mercia and Invesco Perpetual) to fund ongoing operations and new facilities in the US and the UK.

Following a £2.5m investment in FY18 Medherant is now Mercia's second largest LSBS holding at £3.5m. The company has developed a drug delivery patch technology (TEPI Patch) that Medherant states improves existing technologies by enabling higher drug capacities, in addition to better efficacy and user experience. Its lead product is an ibuprofen patch that Medherant expects will become commercially available in 2020. In December 2017, the company raised £3.8m (Mercia invested £2.5m) to progress its ibuprofen TEPI patch into clinical development.

The third largest LSBS investment in FY18 is Eyoto (formerly Aston EyeTech), an ocular care company. Its core product franchise is its eMap systems which are multifunction lens analysers for quality control of glasses (by dual lens power mapping and surface inspection). eMap products C1 and C2 are sold to laboratories as quality control systems while eMap R2 is utilised in shops as a consultancy tool. In addition, Eyoto is developing eBox, a portable system for sales and consulting. In November 2017, Eyoto raised £5m (Mercia invested £1.75m) in a Series A funding round to accelerate new product development and launches.

The only LSBS holding to record a negative fair value movement in FY17/18 was publically listed Concepta whose value reduced by £2.5m from 1 April 2017 to £1.3m on 31 March 2018 following operational and developmental challenges. Concepta develops mobile health systems with its core focus on fertility.

Below is an in-depth look at Mercia's largest healthcare holding, Oxford Genetics.

Oxford Genetics

Oxford Genetics (OG) is a synthetic biology company focused on discovering, developing and producing technologies for a range of industrial and academic applications primarily focused on cell and gene therapies. Its three divisions are focused on viral (adeno-associated viral [AAV] vectors, lentiviral vectors, adenoviral vectors and vaccine technologies), gene editing (CRISPR - clustered regularly interspaced short palindromic repeats) and protein therapeutic (antibodies) technologies. OG's technology and product offerings enable them to pursue a multi-stream revenue model coming from licences and fees as a result of both catalogue sales and custom services.

Of the three divisions, OG forecasts that viral (specifically AAV) and gene editing technologies (specifically CRISPR) will be its main growth drivers. Viral technologies are built on the idea of modifying naturally occurring viruses so they are capable of inserting specific combinations of genes into a patient's cells while CRISPR allows for precise gene edits to be made to a genome (cut out defective genes or add in new genes).

Viral technologies have gained significant clinical traction over the last few years as a result of the approval of the first ex-vivo modified cellular therapies (Novartis's lentiviral modified T-cell therapy Kymriah and Gilead's γ -retroviral modified Yescarta, both approved for rare blood cancers) and the first in-vivo gene therapies (UniQure's AAV1 vector gene therapy Glybera for lipoprotein lipase deficiency and Spark Therapeutics's Luxturna AAV2 vector gene therapy for RPE65-mediated inherited retinal disease). These approvals have provided clinical and regulatory validation of vectors for use as gene therapies, causing an explosion in R&D globally (at 10th October 2018 there were [104 active gene therapy](#) trials utilising AAV vectors). While CRISPR is a comparatively infant technology (no current clinical data from humans, the first CRISPR clinical trial started in [August](#) by CRISPR Therapeutics), it holds significant promise as it allows for precise gene edits to be made to a genome, which is particularly relevant for the multitude of diseases that have single gene deficiencies.

CRISPR and viral therapies could change the treatment paradigms for many diseases, however, many academic or industrial parties lack the appropriate expertise or technology to discover, develop and produce new vector and CRISPR systems. OG plans to leverage its own expertise, technologies and facilities to meet these unmet needs with the aim of becoming a global leader in the supply of gene/cell technologies and products.

OG's third division, protein therapeutics, provides a range of antibody development technologies. Antibody development is a significant market globally, but it is mature which means gaining significant market share will be difficult to achieve. Therefore, we envision the suite of services and products in this sector will be utilised to complement the viral and genetic divisions.

Historic routes with a focus on the future

On completion of his PhD from the University of Oxford, CEO Ryan Cawood co-founded Oxford Genetics in 2011 (£50k seed funding) with Len Seymour (co-founder and non-executive director), with the vision of simplify the process of DNA engineering. Following the development and patent protection of SnapFast plasmid technology (since 2012), Oxford Genetics has received several rounds of investment from Mercia totalling £5.2m (the total investment including from other partners

is £10.3m). This funding was initially via its third-party managed funds before classing the business as an Emerging Star and investing scale-up capital directly. In 2015, it transitioned as an Emerging Star onto Mercia's balance sheet. The team steering Oxford Genetics is in part made up of industry veterans that have guided other Mercia holdings towards profitable exits including CFO Martin Hall (Allinea, exited by Mercia in 2016), non-executive director Matthew Baker (previously CSO at Abzena and CEO/CSO at Antitope) and non-executive chairman David Hames (Science Warehouse, exited in 2018). The company currently has approximately 70 employees and this is expected to grow to around 100 over the next 12 to 24 months.

Investing in technology to enable growth

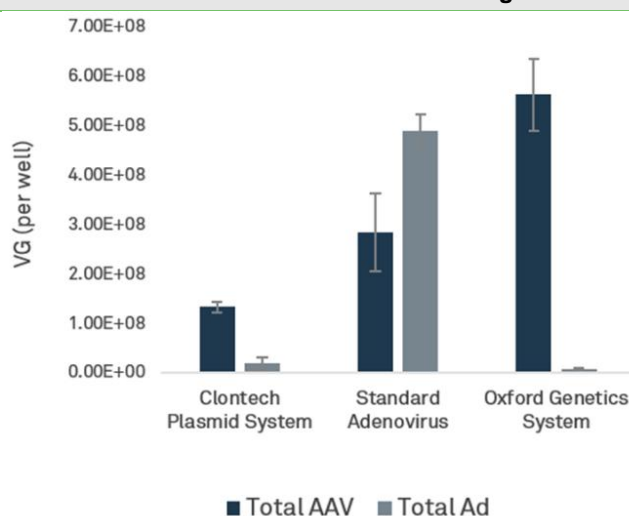
Typically, scientific discovery and development operations are often limited by the number and quality of its personnel, often making revenue growth alongside margin growth extremely difficult. In order to drive both efficiency and quality, OG has built a suite of automated robotic systems that can handle a significant number of the in-house operations. As both the CRISPR and viral markets remain in their infancy, significant opportunity remains for any supplier who can provide a variety of products, at the quality and quantity required. Automated systems enable this to happen in a scalable manner.

In addition to OG's technical abilities, it aims to drive traction of its products by improving the customer's user experience, particularly in relation to custom projects and management, an area notorious across the industry for its inefficiencies and opaque nature. In May 2018, it launched a new online customer portal (Andromeda) for its custom research services, which provides customers with real time updates on the status of projects. The system uses internal bespoke enterprise resource planning software and laboratory information systems. The internal systems importantly provide management oversight of all company projects with fewer personnel than is typical for the industry, enabling effective scalability and cost management of projects.

Viral technologies: AAV vectors dominate as market accelerates

Oxford Genetics offers a range of licensable viral technologies including AAV vectors, lentiviral vectors, adenoviral vectors (Ad) and vaccine technologies. The market and appetite for these technologies has increased rapidly over the last two years, driven by approval of ex-vivo chimeric antigen receptor T-cell (CAR-T) therapies and in-vivo gene therapies, in particular AAV has fast become one of OG's core revenue drivers. AAV are small (c 25nm, c 4.8 kilobases) non-enveloped, non-pathogenic viral vectors (ie do not cause disease) that can integrate into both dividing and quiescent (reversible non-dividing state) cells. They persist in an extrachromosomal state without integrating into the genome; as such expression in dividing cells will be lost over time, which can be advantageous depending on the application required.

OG offers a range of AAV systems to both industrial and academic partners. These licensable technologies including a high titer and high quality suspension transient AAV manufacturing system, contamination free adenovirus-based AAV production system (Exhibit 11), HEK-293 GMP qualified master cell bank for AAV manufacture and inducible AAV packaging cell lines. OG claims its contamination free adenovirus-based AAV production system (Exhibit 11) is the only commercially available system worldwide, typically these production systems retain Ad contaminations, which gives OG a unique advantage in the market.

Exhibit 11: AAV production levels and Ad contamination using OG technology


Source: Oxford Genetics

In addition to the licensable technologies, OG provides a range of customisable AAV vector solutions including but not limited to promoter/capsid engineering and discovery, DNA and expression cassette optimisation and packaging cell line development. The AAV production platform is built on a combination of OG's proprietary AAV plasmids and GMP (good manufacturing practice) cell lines.

The commercial success of gene therapies remains in its infancy, although it is likely to develop rapidly in the coming years. Spark Therapeutics's Luxturna is approved (approved 19 December 2017) for the treatment of patients with a rare form of eye disease (biallelic RPE65 mutant associated retinal dystrophy). In the first six months of 2018, Spark Therapeutics recognised \$6.7m in net product sales. In the case of cellular therapies like CAR-T, ex-vivo vectors are utilised to insert genes into a patient's T-cells that express both cancer targeting domains (antibody fragments) and stimulatory immune domains (trigger an immune response on cancer antigen-antibody binding). This enables a patient's now modified T-cells to target and kill a patient's cancer. Novartis's Kymriah and Gilead's Yescarta are both recently approved, with Kymriah first approved in the US for pALL (paediatric acute lymphoblastic leukaemia) on 30 August 2017 and Yescarta approved for DLBCL (diffuse large B-cell lymphoma) on 18 October 2017. Kymriah reported Q218 sales of \$16m (mainly based on pALL sales) while Yescarta generated Q218 sales of \$68m (based completely on the larger DLBCL market).

Gene editing (CRISPR) division: Automating the next wave of gene-editing

OG has developed scalable robotic solutions to enable high throughput efficient CRISPR genome engineering. Built on a non-exclusive CRISPR licensing agreement with ERS Genomics (signed in May 2017), Oxford Genetics is able to supply CRISPR modified cell lines to the US and EU. Recently (September 2018) this licence was extended to include Asia Pacific as demand for its CRISPR services quadrupled in 2018; this has laid the foundations for Oxford Genetics to meet its ambition of becoming a market leader in mammalian CRISPR cell-line engineering. The global market for CRISPR-based technologies is expected to rise to **\$10.5bn over the next decade**.

Oxford Genetics has largely automated its CRISPR platform using internally developed innovations; enabling a scalable, modular operation capable of meeting the growing demands for CRISPR technologies. Importantly, the company retains rights to re-sell any CRISPR-modified cell line generated from the ERS Genomics collaboration, further adding to downstream revenues stemming from the catalogue. Oxford Genetics recently announced (August 2018) that it had secured a multi-

million pound contract with a leading global e-commerce provider to produce and supply its CRISPR-edited mammalian cell lines.

Much like OG's viral technology, the company offers a range of continually evolving capabilities that plan to keep it competitive within the market. The company aims to offer the highest fidelity CRISPR libraries commercially available (average guide presence of 99.7% in CRISPR libraries), cost effectiveness (automated platform enables cost reduction while maintaining quality) and CRISPR screening solutions (including guide design and cell sequencing/characterisation).

CRISPR is the machinery that enables bacteria to have adaptive immunity to virulent factors. On exposure to foreign genetic material, microbes produce a complementary base-paired guide RNA sequence (gRNA) which recruits an enzyme that can bind to foreign genetic material and modify it in a variety of ways (depending on the specific enzyme); ultimately silencing the foreign genetic material. The level of precision CRISPR can perform this gene-editing with, along with the relative ease of modifying the target gene of interest, has driven CRISPR's rise to prominence in gene-editing over the past five years.

CRISPR technology has paved the way for a new era of gene-editing therapies (surpassing TALENs [transcription activator-like effector nucleases] and ZFNs [zinc-finger nucleases]). Companies with a primary focus of developing such technologies include CRISPR Therapeutics (market cap c \$2.0bn), Editas Medicine (c \$1.4bn) and Intellia Therapeutics (c \$1.1bn). CRISPR Therapeutics recently (August 2018) initiated a [Phase I/II clinical trial](#) for its lead asset CTX001 (out licensed to Vertex Pharmaceuticals) in patients with β -thalassaemia. This is the first in-human study of a CRISPR-based therapy within the US or EU, and is widely considered to be pivotal for validating the approach. In-line with Mercia's sector strategy, Oxford Genetics is not directly pursuing any drug discovery programme but wishes solely to use its expertise in DNA plasmid engineering and viral vector packaging to enable others at an early stage, ultimately aiming for multiple revenue streams from the out licensing of its technology when commercialisation is realised.

CRISPR has also found another role to play in drug discovery that goes beyond the scope of a gene-editing therapy. Libraries of RNA are available that can target virtually any part of the human-genome using CRISPR machinery. Using this genome-wide approach, it is possible to look for genes (and the proteins they encode) that drive a phenotype in various cells (and identify or validate novel drug targets). OG's CRISPR platform is positioned to provide these genome-wide arrays and could see revenues realised in the near term through technology access agreements, similar to the deals announced from Horizon Discoveries earlier this year (which included partnering with AstraZeneca).

Protein Therapeutics: Offering a complete package

After a series of grants from Innovate UK, Oxford Genetics has set itself up to provide a range of antibody discovery services. Grants received in 2017 include £971k to optimise mammalian cell bioproduction and £337k to improve the bioselection process of lead candidate antibodies. The market for antibody based therapies is significant and growing: global sales topped \$101bn in 2017 (forecast to rise to \$192bn by 2024) with the top end led by Humira (\$18.4bn), Avastin (\$6.8bn) and Opdivo (\$4.9bn) (Source: Evaluate Pharma). Being able to provide a range of antibody discovery services and engraining its plasmid technology in any subsequent biomanufacturing could see Oxford Genetics realise both near-term and long-term revenues. However, this is a highly competitive area with multiple contract research organisations offering similar services including one of the largest global developers, Lonza. With the emerging paradigms in gene-therapy treatments (AAV & CRISPR), being able to foster relationships stemming from its antibody services could also be important growth drivers for Oxford Genetics further down the line.

Differentiation is key for OG's long-term revenue growth

In FY17/18, OG signed seven licence agreements and is in ongoing discussions with 22 other parties regarding licensing agreements. The company continues to expand its product offerings and is planning to launch 11 new licensable technologies and services by April 2019. Revenue growth is expected to be aided by a three-year CRISPR contract signed in August 2018, which will deliver minimum revenue of \$8m over the period (potential >\$19.5m).

OG's work can take various forms, typically split into catalogue products and custom solutions. Of OG's growing catalogue selection, customers can purchase various products with a [research, commercial or GMP production licence](#). These licenses generally take the form of:

- **Research:** for research purposes only (one-time fee).
- **Commercial:** provision of commercial services to a third party for monetary gain – typically when utilised to provide a service – does not permit sale, resale, leasing or licensing (one-time fee).
- **GMP production:** for use in therapeutic or diagnostic applications intended for use in both human and non-human. (one-time fee, milestones payments based on trial phase and product approvals, in addition to annual fees).

For OG's custom contracts, terms can vary but typically consist of an upfront fee, ongoing service fees, milestones and a royalty on any potential sales. In the long term we anticipate a growing catalogue of products to drive OG's revenues.

Fast-moving sector brings challenges

The speed at which the cell and gene sector is moving brings multiple challenges. Shifts in market and technology dynamics, regulatory risks, competitor successes, partnering setbacks, and financing and commercial risks will all play a factor as OG expands. The key short-term sensitivities for OG relate to crystallising value from its technology, particularly for its AAV and CRISPR products.

Additionally, OG's current rapid growth in terms of both employees and facilities brings with it operational risks including, but not limited to increased costs, hiring shortfalls or failures, loss of company culture, company structure failures, cash flow limitations and implementation failures of new technologies or systems.

We note that while competition in OG's current core areas of AAV and CRISPR remain limited and currently fragmented, increased commercial success for the technologies would invite new competition. Companies who are able to provide a full suite of gene/cell editing technologies remain limited and OG is currently in a favourable position to benefit as a one-stop-shop. However, sector-wide commercial failure of these technologies would have a significant negative effect on OG's ability to generate revenue.

Currently competitors include significant global players like ThermoFisher Scientific and Sigma-Aldrich, and smaller outfits like Horizon Discovery and Cell Dynamics. We note Horizon Discovery as one of the most relevant comparators. It is listed on the London Stock Exchange's AIM market with a market cap of c £318m. Following its acquisition of GE Dharmacon for £85m (£50m cash, £35m equity) in July 2017, Horizon Discovery Group strengthened its CRISPR capabilities and has subsequently reported strong y-o-y revenue growth (revenues H118: £25.1m vs H117 £12.1m).

Oxford Genetics: Typical of Mercia's approach

Mercia's healthcare investment philosophy aims to limit exposure to capital intensive, high risk/high reward biotechnology companies that could take decades of investment to produce returns.



Oxford Genetics is typical of Mercia's focus on companies that can generate near-term revenues with relatively low cost and limited binary risks. As a result of several rounds of investment from Mercia totalling £5.2m (the total investment including from other partners is £10.3m), Oxford Genetics has built a strong foundation for future growth, particularly in relation to its automated platforms, project management systems and range of technologies offered. OG's multi-stream revenue model coming from licences and fees as a result of both catalogue sales and custom services should enable sustainable growth of the company; however, as with any rapidly scaling business, significant risks remain, particularly in relation to the execution of the company's strategy.

We anticipate Mercia's approach to investing across its LSBS holdings to remain the same in the coming years and we envision both the number of holdings and size of holdings to grow. As a result of the relative infancy of the portfolio company, real cash gains to date have been limited in both number and size. We expect increased focus on fair value gains and cash realisation of the value of the LSBS holdings, with success or failure to achieve these critical to Mercia's long-term ambitions in the sector.

Electronics, materials, manufacturing/engineering holdings

Analyst: Anne Margaret Crow

This sector is led by investment director Dr Mark Volanthen who has held numerous leadership positions in this sector from scale-up to trade sales. Mark is focused on identifying and supporting the next generation of disruptive proprietary technologies in energy and communications together with high-value electronics and manufacturing applications. These technologies are often derived from university research. The sector comprises a diversified portfolio of six companies (see Exhibit 12), targeting large global markets including automotive, consumer electronics, semiconductors, energy storage and mobile communications.

For the year ending 31 March 2018, Mercia invested £3.9m in this sector taking the total investment holding value at the year end to £16.2m representing 24.5% of the total portfolio value. This investment from Mercia has continued to support rapid expansion in this sector, with four of the direct investments receiving follow-on funding during the year. There have also been several follow-on and new investments in the managed funds portfolio, strengthening the pipeline of future direct investments over the next two years.

The portfolio continued to make positive progress during FY18 with several assets accelerating commercial traction through global partnerships with leading industry players. Since proprietary intellectual property within each investment underpins the disruptive technologies being commercialised, a number of new patents were applied for across the sector during the year.

Exhibit 12: Electronics, materials, manufacturing/engineering holdings

Company	Net investment value at 1 April 2017 (£000)	Net cash invested year to 31 March 2018 (£000)	Fair value movement year to 31 March 2018 (£000)	Net investment value 31 March 2018 (£000)	% of capital held at 31 March 2018
Warwick Acoustics	2,791	1,800	1,561	6,152	64.0%
Impression Technologies	1,500	1,520	87	3,107	26.6%
Smart Antenna Technologies	2,259	450	(561)	2,148	28.0%
LM Technologies	1,770	100	43	1,913	41.4%
sureCore	1,500	-	-	1,500	23.0%
Faradion	1,299	-	-	1,299	13.6%

Source: Mercia Technologies

Warwick Acoustics, a University of Warwick spinout, is a creator of personal listening experiences based on its patented electrostatic audio transducer modules. The company is focused on delivering disruptive listening solutions to two markets, the high-end headphone market and the \$8.0billion in-car audio market where its product's thin, lightweight form factor and power efficient characteristics deliver significant value. During 2017, the company released its first product, the Sonoma Model One headphone system, a premium electrostatic wired headphone system aimed at the professional use audiophile community. The company is now expanding its headphone product portfolio and developing its first products for the automotive market.

Impression Technologies, a spin-out from Imperial College, London and the University of Birmingham, provides advanced high-temperature metal forming technologies that enable cost-effective lightweight components to be realised. Its patented Hot Form Quench (HFQ[®]) technology is used for the mass production of complex, deep drawn, high-strength aluminium structures. Multiple applications exist within the automotive, aerospace, rail, industrial and consumer electronics sectors where it offers significant savings in weight, cost and system complexity over alternative processes with the ability to transform the use of aluminium for volume applications. It is currently using HFQ to manufacture over 25,000 parts per year for four production vehicles, including the Aston Martin DB11 and is actively engaged with the majority of global automotive OEMs.

Smart Antenna Technologies is a spinout company from the University of Birmingham. It has designed, developed and patented a ground-breaking single antenna solution for mobile and portable devices requiring multiple data connections. Management is engaged in commercial discussions with two global manufacturers of mobile devices, laptops and tablets who are interested in utilising its technology. The company has also signed an agreement with a global portable device manufacturer to build a prototype, incorporating a simplified version of its antenna technology.

LM Technologies has been focused on Bluetooth and WiFi wireless modules and adapters since 2004, manufacturing millions of devices to date. Its product range includes Bluetooth and WiFi wireless modules and adapters. Its plug and play products offer solutions for industrial markets such as retail, industrial automation, automotive, medical, security, building facility, machine-to-machine (M2M) and vending markets.

sureCore is a provider of low power memory solutions for semiconductor applications. It has developed a low power memory portfolio, which is intended to satisfy growing market demand for more on-chip memory and lower power consumption in leading edge devices, such as those serving the Internet of Things (IoT), wearables and networking spaces. Memory designs developed by sureCore have shown in excess of 50% saving in dynamic power consumption and up to 20% reduction in static power, compared to industry standard solutions. The product is silicon-proven in leading edge manufacturing technologies and is being evaluated by a number of potential commercial partners.

Faradion is pioneering the next generation of advanced, low-cost battery materials. These novel materials employ sodium-ion technology which, when incorporated into batteries, is expected to deliver performance similar to the leading products currently on the market in terms of performance but at a lower cost. Additionally, these next-generation materials will also be manufactured using more sustainable materials, since sodium is far more abundant than lithium and its salts are easier to obtain.

We include an in-depth look at Impression Technologies below. This has been selected because it has a patented technology with the potential to displace sheet-formed mild aluminium and high grade steel alloys, is already generating commercial revenues and has the potential to generate royalty income from multiple markets. Management estimates that the automotive market alone could be worth c\$100bn annually.

Impression Technologies

Shaping the future of manufacturing processes

Impression Technologies (ITL) has developed a proven, patented process for manufacturing advanced, light-weighted components from high-strength aluminium. The process, known as Hot Form Quench (HFQ) technology, offers significant savings in weight, cost and part complexity compared with traditional forming techniques and enables designers to create components from high-strength aluminium in complex shapes that would not otherwise be possible. HFQ technology addresses substantial global markets including automotive, aerospace, mass transit, industrial and consumer electronics. ITL is already generating meaningful commercial revenues (management forecast c £600k in 2018) from the design and manufacture of low volumes of components (over 25,000 parts per year) for luxury car manufacturers Aston Martin and Lotus. However, longer term, ITL intends to license the technology to OEMs and their manufacturing partners (Tiers) for use in medium- and high-volume production lines.

ITL was formed in 2012 as a spin-out from Imperial College, London, although some of its IP was initially developed at the University of Birmingham. It is jointly owned by IP Group and Mercia

Technologies, which have collectively invested c £11m to date. It is based in Coventry on the site of a former Jaguar factory, where it owns and operates a low-volume HFQ production line and employs over 40 people.

HFQ enables mass adoption of aluminium for light-weighting

Aluminium is around one-third the density of steel. This means that it is commonly used as a substitute for steel in the medium and premium automotive market, where the increased fuel-efficiency arising from weight-savings offsets the higher cost of aluminium compared with steel. However, stamping components made out of high-strength aluminium, which is the traditional and typically the most cost-effective method for manufacturing high volumes of metal components, has not been viable because the limited ductility of high-strength aluminium results in components splitting and cracking when formed (see Exhibit 13). Historically, this has restricted the use of aluminium to low-volume applications where precision machining or multi-stage forming is economically viable or to higher-volume applications of simple parts that can be cold-formed.

Exhibit 13: Cold-formed component



Source: Company data

Exhibit 14: HFQ-formed component



Source: Company data

Since 2010, legislation to reduce vehicle emissions has become increasingly stringent. Improving fuel economy through light-weighting, ie reducing the weight of vehicles while keeping them the same size is the approach most widely deployed by automotive OEMs to address the new emissions standards. A survey by Penton Research in 2016 showed that the light-weighting route was more prevalent than the adoption of bio-fuels, a switch to electric vehicles or even energy efficiency programmes. Manufacturers of battery powered electric vehicles (EVs) are particularly keen to reduce vehicle weight as this will improve driving range and reduce the number of batteries required for propulsion. Concern about range is one of the key factors currently limiting battery powered EV adoption, especially in the absence of extensive networks of public charging points, as is the high cost of the batteries needed. The Automotive Council UK and the Advanced Propulsion Centre in the UK has predicted that a 25–30% reduction in weight of conventional and electric vehicles is required between 2015 and 2035 to meet emissions and EV range requirements. Business intelligence providers CRU forecast EV sales rising to 42m vehicles by 2030, representing demand for nearly 10m tonnes of aluminium.

Switching from high-strength steel to low-strength aluminium grades that are relatively easily formed is one option for reducing vehicle weight. However, achieving the requisite component strength with these grades of material necessitates the use of thicker gauge metal sheets and/or reinforcements. This makes components heavier, thus compromising some of the potential weight reduction and involves additional pressing and assembly steps, adding to the cost of production. To achieve future weight saving targets OEMs need a low-cost, high-volume manufacturing technology that overcomes the difficulties of forming complex-shaped components from high-strength aluminium.

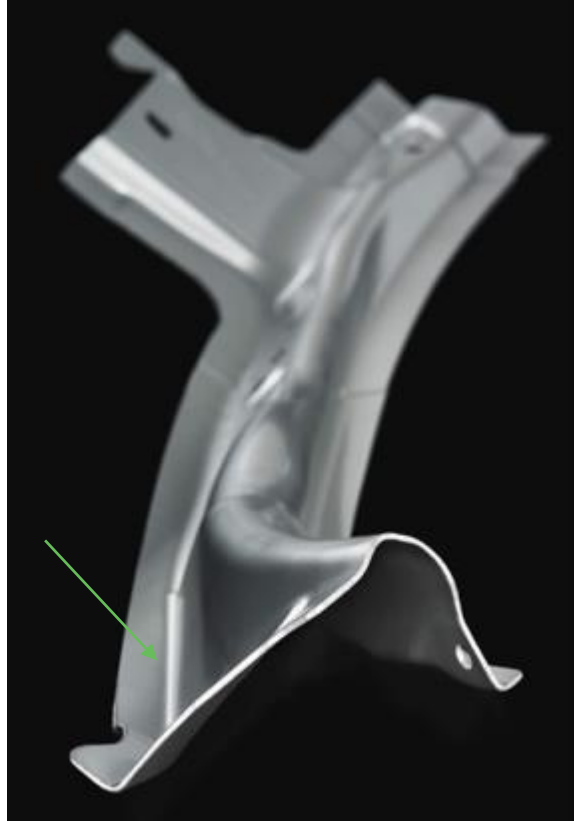
Based on its in-depth knowledge of the mechanical and metallurgical properties of high-strength aluminium, Impression Technologies has developed a novel, patented hot-forming process equivalent to that used for hot-forming high-strength steel. This process can be used for pressing light-weight, complex-shaped high-strength aluminium without causing splits or cracks (see Exhibit 16).

Exhibit 15: Location of A pillar in Aston Martin DB11



Source: Company data

Exhibit 16: Detail of A pillar in Aston Martin DB11



Source: Company data

Light-weighting is not the only benefit of adopting HFQ technology. For example, HFQ is used to manufacture A pillars for production models of the Aston Martin DB11 (see Exhibits 15 and 16). The HFQ process enables the creation of a high strength aluminium part with a very tight radius in the areas shown by the arrow, thus improving driver visibility. HFQ also enables a high-strength aluminium part with a deep cross-section (98mm) to be created in a single press step rather than multiple ones, thus reducing manufacturing, tooling and assembly cost. In this example, it enables the front header connection to be formed as an integrated part of the main pillar and dispenses with the need for a reinforcement, thus reducing assembly cost compared with lower-strength aluminium. A case study based on a cross member developed for the Morgan Motor Company under a project funded by Innovate UK showed that the HFQ solution using high-strength aluminium trimmed the weight by 32%, cut the number of parts from 11 to eight and reduced the overall cost of production by 37% compared with an existing cold-formed low-strength aluminium part. In another case study based on a door ring for an undisclosed EV OEM, the HFQ solution reduced weight by 30% compared with a conventional cold pressed solution and integrated three parts forming the ring into a single component. The HFQ alternative also cut the cost of manufacturing each door ring by 25% and of making the tools required by 50%.

Scalable, low cost licensing model

ITL has been operating the world's first HFQ production line since 2016 and is already generating meaningful revenues (management forecasts c £600k in 2018) from the manufacture of low volumes of components for Aston Martin and Lotus. This is supplemented by revenues from

providing design and simulation services to OEMs and Tiers to gain maximum benefit from HFQ deployment, as well as with government grants.

This is not, however, the business model intended longer-term. Management is already engaging with OEMs and their manufacturing partners, aluminium suppliers and equipment suppliers with the goal of making HFQ a global standard for aluminium light-weighting. The intention is for ITL to monetise its IP by licensing the HFQ technology to OEMs and Tiers designing and manufacturing light-weight parts in high-strength aluminium. In this business model, it would generate additional revenues from engineering services such as design and simulation, from making prototypes and low-volumes of components prior to transferring manufacturing to high-volume licensees and from other services including materials characterisation, training, accreditation and ongoing technical support.

The licensing model provides a route to high operating margins (we note the doyenne of licensing, ARM, reported 48% EBITDA in FY16) and low levels of capital investment. It also provides a mechanism for gaining high levels of penetration in multiple markets without huge investment in sales and marketing, since the strategic partnerships with aluminium suppliers, manufacturing Tiers, software providers and equipment manufacturers will create market pull for aluminium structures manufactured using HFQ.

Management team

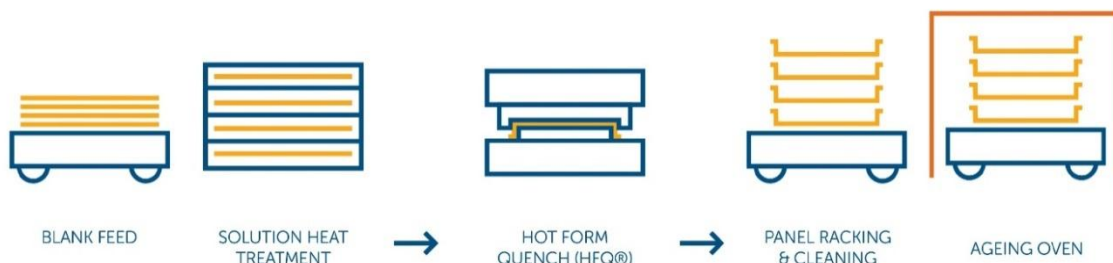
The senior management team has been strengthened over the past two years to support ITL through the transition from a technology development company to commercialisation on a global scale. The management team is supported by an advisory board that includes luminaries such as a former CTO of a global automotive OEM, the former CTO of Invensys and the inventor of the HFQ technology, Professor Jianguo Lin of Imperial College.

Jonathan Watkins, chief executive: Jonathan was appointed CEO in August 2016. He has 25 years' experience in commercialising technology in the automotive, industrial and cleantech sectors. Previous roles include COO/commercial director of Ceres Power, director of marketing, Europe and director global product management of Textron Fastening Systems and product manager, Federal-Mogul.

Rex Vevers, CFO/COO: Rex joined ITL full time in January 2018. He has 30 years' experience in funding and commercialising technology in the automotive, industrial, FMCG and cleantech sectors. Previous roles include finance and commercial director of Torotrak, group finance director of Ceres Power and group finance director of OSI International Foods.

HFQ technology overview

Exhibit 17: HFQ system for high-strength aluminium alloys



Source: Company data

HFQ is a hot forming production method for stamping complex shaped aluminium components from high- and ultra-high strength alloys. The HFQ process press forms hot aluminium blanks at high speed. These are quenched in the press tool, followed by artificial aging to achieve full strength.

Exhibit 18 : ITL's commercial demonstration facility in Coventry, UK


Source: Company data

ITL's unique sales proposition lies in its in-depth understanding of the thermal and mechanical properties of high-strength aluminium, which is encapsulated in simulation software. This generates highly accurate predictions of the final pressed part, reducing the cost of OME's design and development significantly speeds up design cycle time. Since HFQ uses standard metal forming equipment that is used for hot forming of high strength steels, follows a similar process flow (see Exhibit 17) and uses readily available low cost, as-rolled standard aluminium alloys, a switch to HFQ requires relatively low levels of capital investment.

We note that there are already around 420 hot stamping lines for steel in operation globally. New production lines are being added at a rate of 25-30 each year as the number of hot stamped parts has risen to around 30 per vehicle. This represents a proxy for the HFQ opportunity as OEMs seek to light-weight vehicles by substituting steel with aluminium.

History to date

Exhibit 19: Notable events

Date	Event
2012	Formation. Acquired exclusive rights to IP from the University of Birmingham and Imperial College, London
2014	First investment from Mercia's managed funds
2015	Becomes Mercia Emerging Star. Aston Martin DB11 first production car to use HFQ
2016	Opening of world's first HFQ facility in Coventry
November 2017	Start of Raceform project led by ITL to validate HFQ for high volume production (see below)
Q418	Working with a major commercial aerospace OEM on a £13m project to demonstrate technical and commercial benefits of replacing existing high-cost aluminium forming processes with HFQ. Management anticipates commercial production from Q420.

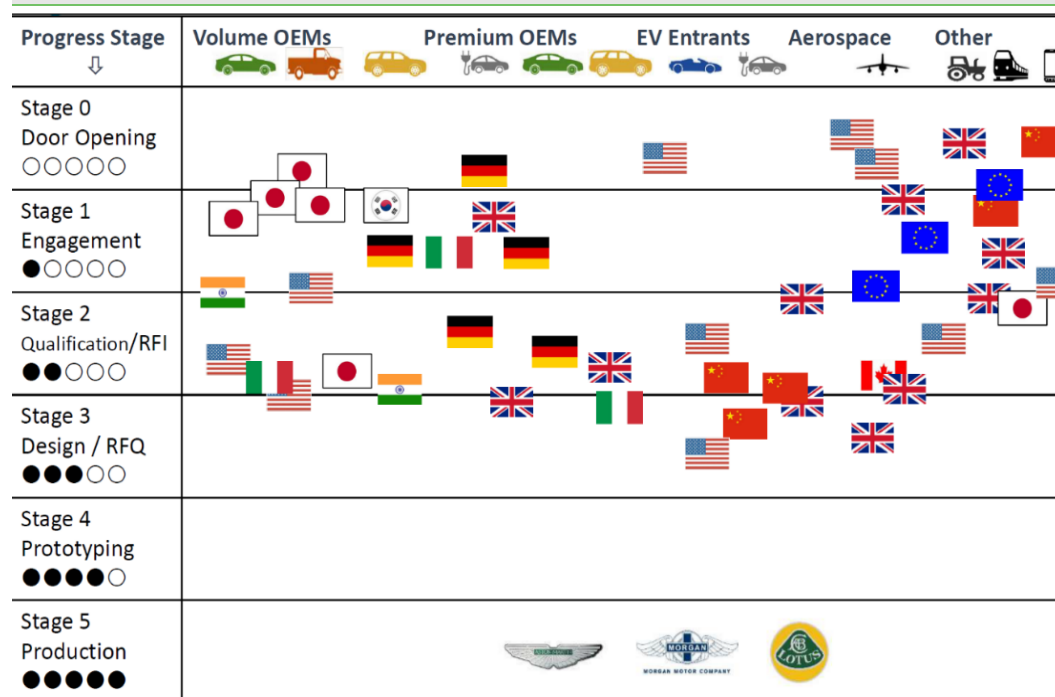
Source: Edison Investment Research

Generating commercial revenues now – stage path to market penetration across multiple sectors

As discussed above, ITL is already supplying several UK luxury car OEMs with production parts totalling 25,000 units per year across four different production vehicles. Management expects this will increase to c 100,000 parts per year by 2020. It is also actively engaged with the majority of global automotive OEMs with the goal of having at least five high-volume press lines operated by third parties in production by 2020. Additionally, it is working on multiple projects for OEMs in the

aerospace, mass transit and electronics sectors. These projects are currently generating revenues from design, simulation and prototyping activities ahead of potential revenues from licencing HFQ. The current status of these programmes is presented in Exhibit 20. Management's estimate of the likely adoption of HFQ in different sectors is shown in Exhibit 21. These volume production programmes are supported by aluminium suppliers and press line integrators and will involve Tiers and OEMs signing licences to use the HFQ technology.

Exhibit 20: Engagement with OEMs



Source: Company data

The successful conclusion of the £9.6m RACEForm project noted in Exhibit 19 will help drive market adoption. The project is intended to demonstrate that HFQ is suitable for high-volume automotive production by realising cycle-time improvements and process scale-up. An additional aspect of the project is demonstrating that HFQ is compatible with recycled aluminium. ITL is leading a consortium that includes Gestamp, which is the world's largest supplier of hot stamped steel components to global automotive OEMs; Novelis, which is the world's largest aluminium supplier to global auto OEMs; a major UK-based passenger car OEM; Innoval Technology; Imperial College London and Brunel University London. The project includes high-speed trials that aim to achieve a cycle time of less than 15 seconds.

Multiple global market opportunities

ITL is currently producing HFQ parts for premium auto OEMs. However, since light-weighting is important in multiple market sectors, there is significant potential for HFQ technology in other sectors as well. Management's phased approach to market penetration is shown in Exhibit 21. We note that for each segment commercial engagement will begin with the generation of revenues from engineering services and prototyping/low volume manufacture before progressing to revenues from licensing and royalties.

Automotive

Management estimates that there is the potential to use HFQ in the production of at least 11–15 parts in a typical car. With up to 30m cars each year by 2025 (out of > 100m total) requiring significant light-weighting to meet CO₂ emissions and electrification targets, this represents a

potential global market for HFQ light-weight parts of c \$100bn annually. Applications include body-in-white, chassis and closure for internal combustion engine, hybrid and electric vehicles. McKinsey expects that OEMs' willingness to pay for weight savings will increase as they are obliged to meet fuel economy and CO₂ emissions targets, with the premium vehicle OEMs pay ranging from \$3–20/kg weight saved, depending on car class and powertrain.

Aerospace

Aluminium is already widely used within the aerospace industry because of its low density compared with steel. HFQ offers significant savings compared with the precision machining and super plastic forming techniques currently used for making aluminium aerospace parts with respect to manufacturing cost and (compared with precision machining) material utilisation. Applications include seating components, wing ribs, nacelles and engine lip skins and flaps. These collectively represent 100k-1m parts per annum. We expect the royalty per part in this sector to be higher than automotive because of the greater need for saving weight.

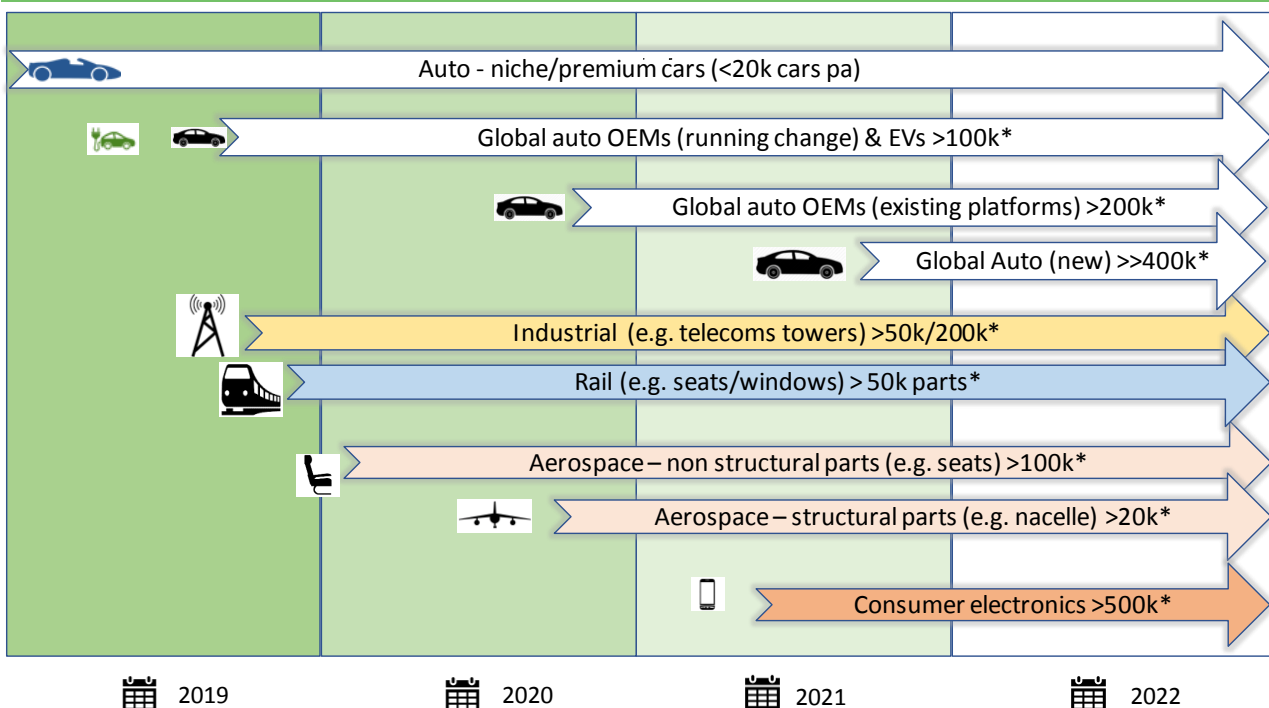
Mass transit

Light-weighting is critical for high-speed trains to achieve the required performance. There are few viable options to the deployment of HFQ. Potential applications include seats, window surrounds and other interior components.

Electronics

HFQ offers the potential for stronger, thinner, more robust mobile phone cases, replacing the slow and expensive process of machining from solid aluminium. The volume of some popular models eg researcher Canalys estimated that Apple sold 29m iPhone X devices during Q417, means that cutting even one gram of weight per device shipped represents a material cost saving across a complete production run. Moreover, weight and form factor are important considerations for consumers when choosing between alternative products.

Exhibit 21: Phasing of market penetration of multiple sectors



Source: Company data. Note: *Parts per annum for a single application, of which there could be several per vehicle.

Alternative techniques for forming aluminium

There are no direct competitors to HFQ technology for processing high-strength aluminium. As discussed above, while cold stamping is suitable for manufacturing simple parts with a shallow draw or narrow radii, it cannot be used cost-effectively for more complex shapes (see Exhibits 13 and 14). While superplastic forming may be used for high-strength aluminium parts, it is an inherently slow process. A cycle typically takes four to eight minutes, in which the sheet metal is heated so it becomes soft and then argon under pressure is introduced into the forming cell, pushing the sheet into the tool cavity. It also requires complicated tooling that prevents the argon from escaping. These factors mean that the technology is not cost-effective for high-volume applications and therefore restricted to niche low-volume parts. Management estimates that substituting superplastic forming with HFQ for an aircraft nacelle part could reduce the cost per part by over 50%.

Alternative light-weight materials

Carbon fibre reinforced plastic offers a 50-60% mass reduction compared with similar components in steel. However, the material itself is 20 times more expensive per kilogramme than high tensile steel and c 7 times more expensive than high-grade aluminium alloys. Component production is slower than using HFQ or conventional metal forming techniques, adding to cost, and there are issues with recyclability.

What could success look like

Continued growth within the automotive sector and expansion into the related areas of aerospace and mass transit, coupled with the execution of ITL's licensing model, should assist ITL in making HFQ a global industry standard for processing high-strength aluminium. Management believes that ITL will become significantly cash-generative in the next two to three years, opening up options of either a trade sale to an industry incumbent or IPO.

Software and the internet

Analyst: Dan Gardiner

Mercia's Software & Internet portfolio was valued at £11.0m at 31 March 2018, representing 16.7% of its total portfolio value. The sector is led by Alistair Forbes who has extensive operational experience from the scaling and general management of software businesses. Three businesses (Intelligent Positioning, Intechnica and Voxpopme) account for the bulk of this value. As the largest stake in the sector, we opt to profile Intelligent Positioning below, but the prospects for Intechnica and Voxpopme are equally as exciting. Following the £10.5m sale of Mercia's Science Warehouse stake during FY18, £5.4m was invested in this sector in FY18 with Intechnica and Voxpopme, receiving £3.75m and £1m, respectively. In the period, Mercia sold its 62.5% stake in Science Warehouse (£9.91m net investment value as of 1 April 2017) to Advanced Business Software for £10.5m in cash, a £610,000 (14.8%) cash gain."

Intechnica, originally formed in 2006 as a specialist web performance consultancy, has evolved to specialise in cybersecurity. The consultancy business continues to grow but the greater value creation is expected to come from its Netacea product, a tool to protect against malicious botnet activity such as unauthorised account takeover. This tool detects and blocks attempts by automated robot machines to access company websites. As these attempts become ever more sophisticated, detection tools evolve and an arms race develops. The key differentiator of Netacea is its in-built artificial intelligence that enables it to evolve as the threat changes. In March 2018, Mercia valued its 28% stake in Intechnica at £4.0m, implying an EV of £14.4m.

In addition, Mercia held a 12% stake in Voxpopme as at 31 March 2018, a Birmingham-based firm providing video analytics to the market research sector. Adding video to market research provides a potentially much richer dataset and its analytical solution helps companies extract relevant insights from this data quickly. The company has attracted a number of high-profile customers already, including Microsoft, Aviva, GM and Verizon (as well as some interesting partnership opportunities), and the company anticipates it will double in 2018. Mercia's 12% stake was valued at £1m (the price at which it invested in FY18) in March 2018, implying an EV of £9.5m.

Intelligent Positioning

Overview

Intelligent Positioning's (IP) software platform combines search ranking data, market intelligence and analysis of large datasets, to inform business critical decision making. It has over 80, largely blue chip, customers generating high margin, recurring revenues that the company indicates are currently growing by 30-40% y-o-y. The business is fully funded to reach breakeven in early 2019 but has several opportunities to accelerate its rapid growth.

History to date and description

After several years working with clients IP identified a need for a real-time software platform capable of analysing organic search results and began construction of Pi-Platform (Pi-P). Launched in 2014 under the Pi-Datametrics brand (Pi), this platform combined search ranking and volume data across different search engines, markets and keywords. Using a proprietary equation, the data are aggregated into a share of voice (SOV) metric that enables clients to measure their relative position in 'organic' search. Pi-P is cloud-hosted and is sold exclusively in a software-as-a-service (SaaS) configuration.

Pi subsequently added two additional products to the platform:

- **Pi-Vault (Pi-V)** enables digital marketing agencies to access Pi's database. It excludes access to some analytical tools but agencies can easily see performance across multiple categories
- **Pi-Market Intelligence (Pi-Mi)**, a premium tier product that takes data from Pi-P and combines it with other datasets to provide commercial and strategic insights

In just four years Pi has attracted a roster of over 80 largely blue chip clients including Tesco, Vodafone and Invesco, many of whom have multiple brands (in August 2018 Pi was running analytics on over 150 brands). Its presence is particularly strong in retail, a sector where the shift to online has had a particularly dramatic effect, but it is broadening to other sectors and becoming increasingly international (see for example Edelman in Exhibit 22). Pi also sells through 15 channel partners and these relationships are particularly useful in expanding its geographic focus.

Exhibit 22: Pi's blue chip client base



Source: Company data, Edison Investment Research

Pi is based in Brighton and currently employs 55 people. It also has offices in London, Hyderabad, Bangkok, Singapore and New York. After IP's pivot into SEO analytics in 2014, Mercia made its first investment direct from its balance sheet in 2015. As at the end of March 2018, Mercia had invested a total of £3m in the business and held a 28.8% stake.

Management team and shareholders

All four co-founders remain shareholders and actively involved in the business. Together they own a 62% share.

- **Daniel Titterton, co-founder and CEO.** Daniel co-founded IP in 2005, as an SEO consultancy specialising in interactive and digital strategy, and Pi-Datametrics in 2014. He leads on business strategy and product development and owns a 14% share of the business. His background is in both interactive and creative marketing. Prior to 2005 he was head of Arc Interactive in China, where he managed interactive strategies for multi-national brands across Asia, and was art director at JWT.
- **Sam Silverwood-Cope, co-founder, director and chief marketing officer.** Sam joined Ton-UK (IP's parent company) in 2006 and IP shortly after. He has over 20 years' marketing experience, specialising in global strategy, technology and search engineering. Prior to joining IP Sam worked at BD Network, JWT and Kazoo in various advertising roles. He owns a 6% share of the business.
- **John Earnshaw, co-founder and CTO.** Originally a lecturer in business and emerging technologies at Brighton, John started an online consultancy called WebObjective in 2002

before co-founding IP in 2007. John is responsible for designing the architecture behind Pi's engine and regularly presents at Brighton SEO and other leading industry events globally. He owns a 14% share in the business.

- **Garry Titterton, chairman.** Garry joined IP following a distinguished career in marketing and advertising. Previously he was a visiting professor on the executive MBA course at Tonjin University in Shanghai, gave lectures at INSEAD Business School, Perugia and Madrid Universities among others and written books on branding. Prior to that he was president and CEO of the Asia Pacific region for D'Arcy Worldwide and executive vice president of Asia Pacific for McCann Erickson. His original investment helped fund the business and he owns a 29% share.
- **Alistair Forbes, Mercia.** Mercia's 29% direct stake in the holding company (Ton UK) is managed as part of Alistair's software and internet portfolio. This portfolio focuses on investments in business to business Software-as-a-Service (SaaS) companies, artificial intelligence, cyber security and marketing technology. Having created, built and sold software businesses, Alistair brings both extensive technical and business experience.
- **Other shareholders.** The remaining c 6% of shares are held by other senior management and Angel investors.

Market background

The ranking of a business in online search results is increasingly critical to (and reflective of) its financial performance. For example, online sales accounted for [24%](#) of non-food retail sales in the UK in 2017: this proportion is rising steadily and is significantly higher in segments such as technology and media. Even when the sale is ultimately made instore, awareness is often built up through research undertaken online via search engines.

Companies have two main options to boost their presence in search results: paid advertising or optimisation of website content to improve organic search result ranking (search engine optimisation – SEO). In paid advertising, a retailer can bid to pay a 'cost per click' on certain keywords. The highest bidders are displayed on the search return page and the company pays for every click it receives. SEO is free but its effectiveness is determined primarily by the ranking of the search result (higher up the page is better). Historically established brands, with large marketing budgets, focused on paid advertising. Newcomers, with limited marketing resources, had to be more innovative and focused on optimising their position in organic search. An unpaid for result is often regarded as more "trusted" by consumers, therefore organic search can be a very cost effective way of building an online brand. Today, all players recognise the value of organic search and see it as a vital component of their long-term digital advertising strategy.

Google (c 90% of online searches) primarily determines the 'authority' of a webpage using algorithms that assess the 'authority' of a page based on 1) how many pages link to it; and 2) the authority of those pages. However, a whole industry has evolved to identify ways to enhance page ranking. One of the more common legitimate methods is constantly updating a webpage with content containing relevant keywords. Over time, search engines adapt and change their algorithms to ensure their results remain relevant and therefore SEO strategies must evolve. Analytics engines that capture and store ranking information enables digital marketing teams to quantitatively assess the effectiveness of these SEO initiatives. These tools can highlight how performance changes over time and varies between specific categories, geographies or platforms.

One big SEO issue is the extent to which additional content, instead of boosting authority, can, if not structured properly, compete with existing material to undermine a ranking position. Multiple domains, duplicate content and international conflicts often lower the ranking. The issue often emerges when a company tries to launch a new product or acquires a peer with overlapping or competing products. The impact is often specific to certain geographic locations, keywords or times

and therefore only an analytic engine able to capture very granular ranking data can detect the problem. Pi was one of the first tools to be able to shine a light on the problem. Its engagement with Sky content teams in particular focused on identifying and resolving these conflicts.

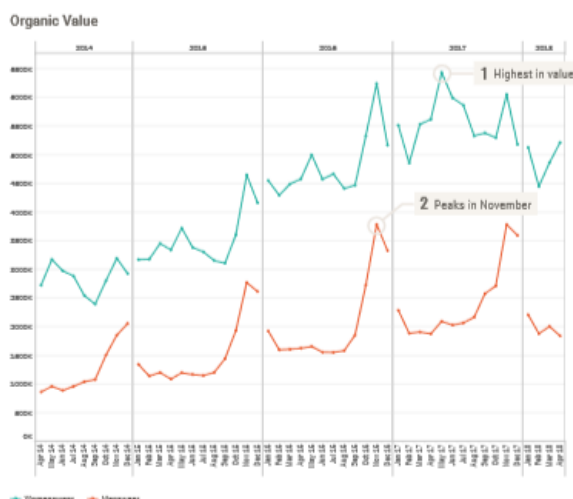
Additionally, not all ranked positions are equally valuable – it changes according to the keyword and over time. To assess the overall success of a digital marketing strategy across multiple keywords, value multipliers must be applied that reflect this (Exhibit 23). Pi has built up a proprietary “Organic Value” score” (OVS) methodology to translate the ranked position into value.

Organic search information can also be used strategically to provide a detailed picture of the competitive landscape: who the main rivals are in particular categories and how their strategy is evolving. Pi’s organic search data enables an aggregated ‘share of voice’ to be calculated. Its recent analysis of the retail sector (Exhibit 24) highlights ASOS’s dramatic decline in organic share of voice in H118 that was followed one quarter later by a [profits warning](#).

Combining this information with additional datasets can provide even greater insight. Weather is an important and unpredictable variable, particularly for clothing retailers: it can drive unanticipated demand in some categories and cause inventory build-up elsewhere. By combining Pi’s search dataset with weather data and applying a regression analysis, Pi can help retailers predict the impact of changes in weather on overall demand. The company is exploring other datasets, on news events for example, which can boost search interest in certain categories. One particularly interesting area is social media. Clearly, advertising and trends on social media can drive demand directly but they can also have indirect benefit discernible through search volumes. Combining search and social media datasets could help quantify this relationship.

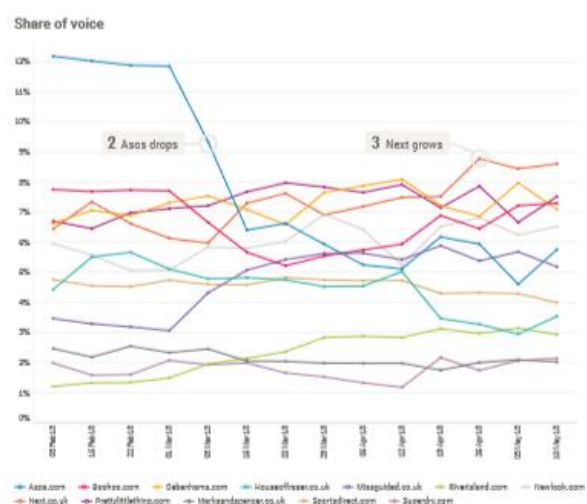
It is [estimated](#) that global spending on SEO is currently c \$65bn and growing at c 5% pa, primarily driven by the growing value of the online channel. There are no detailed estimates of the size of the software component of this spending but it is expected to grow by over 15% pa between 2018 and 2022.

Exhibit 23: Change in ‘organic value’* in the UK retail sector, April 2014 – April 2018



Source: Company data. Note: *Definition on page 35.

Exhibit 24: ‘Share of voice’*, 8 February – 10 May 2018



Source: Company data. Note: *Definition on page 38 (above).

Competition and differentiation

The market for SEO analytics software appears to be relatively fragmented. Most of the players currently in this space appear to have similar backgrounds to Pi: SEO consultancies that have developed bespoke tools to help address their clients’ digital marketing needs. As most remain privately owned, little public information is available. Pi’s competitors include: MOZ, SearchMetrics,

BrightEdge, Conductor (recently purchased by WeWork) and GetStat. Pi differentiates itself in four key areas:

- **Product level differentiation:** Pi believes the breadth and frequency of data collected by its platform is substantially greater than most of its peers. The frequency of data collection is particularly important for identifying cannibalisation issues.
- **Organic value score (OVS) methodology:** in addition to the frequency and breadth of its database Pi has developed a proprietary methodology for converting keyword search and ranking data into a value metric. This can be used to calculate share of voice – an estimate of market share.
- **Marketing mindset:** Pi's digital marketing experience can be applied to the data to identify the best opportunities to enhance organic performance and provide wider business insight.
- **Converting data into wider business insights:** understanding changes in ranking, including the impact of variables such as weather and pricing, enables Pi to provide relevant, real-time insights into business processes such as forecasting, pricing and strategic campaigns.

Growth opportunities

Pi is already delivering a highly impressive 30-40% y-o-y organic growth rate according to management. Key to this is the highly scalable platform the company has constructed. With the platform currently running 2.4m search queries daily, the database is growing by 240m datapoints every day. Nevertheless, management believes the business can grow faster and has identified three key initiatives that could deliver this acceleration:

- **International expansion.** International success has been achieved despite modest investment thus far. Additional sales resource could accelerate this growth still further. This international sales and marketing spend could be accompanied by expanding data collection. Domestic and US clients are increasingly interested in expanding the analytics to cover international, particularly Asian, markets.
- **Social media.** Influencers and other advertising on social media play an ever more important role in opinion forming. Adding a social media dataset that will enable it to assess its impact on search engine results.
- **Additional categories.** Pi currently tracks 650 product categories but has the capacity to broaden this coverage still further.

Potential risks

We believe the market for SEO analytics platforms is set to grow significantly over the long term as the shift to online accelerates and companies adopt increasingly sophisticated processes to address the market. Nevertheless Pi faces many of the generic risks encountered by businesses attempting to drive rapid growth. Sustaining it over the long term requires establishing robust and scalable business processes and attracting and retaining key staff. Management believes the company will require additional capital to maximise its potential. Maximising renewal values and achieving revenue growth with existing customers will be key to sustaining long-term growth.

Relevant financial information and valuation

Given limited disclosure and the early stage of development it is not possible to forecast or value IP at present. Nevertheless, based on our conversations with management, it is possible to draw together a picture of what could be achievable if the company can execute on its opportunity.

The Pi business held by IP is currently generating 30-40% y-o-y organic growth and the growth rate is accelerating according to management. All revenue is SaaS based, recurring in nature and high gross margin. Customer churn in 2018 is currently tracking under 2.5%. As the company adds more



and more clients, the vast majority of the incremental revenue should drop through to the bottom line. We understand that Pi is already breakeven on an EBITDA basis. On the current plan, the group (IP) aims to be net profitable in early 2019 and has sufficient funding to reach that point. The company has set itself a target of generating over £5m in revenue in 2019 and believes that, while additional investment could accelerate this growth, it is not needed to reach this figure. At the end of March 2018, Mercia valued its direct 28.8% stake in IP at £4.2m, implying an EV of £14.7m.

Valuation

Portfolio NAV (£66.1m)

As is typical for IPC companies, the majority of value for the direct investments is concentrated in the largest few companies and Mercia's share price will clearly be affected by any major events or funding rounds that alter the value of any of these key investments.

Mercia provides detailed portfolio valuation updates with earnings reports and, at the end of each interim and annual financial period, Mercia formally approves the value of all its major balance sheet investments, which is used to derive the portfolio NAV. At FY18, the portfolio value for the direct investments was £66.1m, which compares to £52.0m in FY17 and £38.1m in FY16. Of the total, 99% was derived from the top 20 companies.

The investments are valued at fair value based on the International Private Equity and Venture Capital Valuation Guidelines (IPEVCG). Early-stage companies often have limited or no revenues, and therefore the most appropriate fair value methodology is based on observable market data (specifically the price of recent funding rounds) or at cost, in the case of a new direct investment.

The inherent difficulty with the NAV is that it is often a reflection of the most recent transaction, rather than an audited figure or even an assessment of the underlying business model. We note that there is limited visibility so far regarding co-investment rounds for specific companies within the portfolio, as most are still at an early stage.

In addition to using the company's assessment of NAV per investment (based largely on historic funding rounds), we have profiled several of the subsidiary businesses to assess the total potential within the portfolio. While it is impossible to assess a precise valuation range given the limited visibility and early-stage nature of the assets, we believe that concrete evidence of operational progress (milestones achieved) should lead to the ultimate realisation of additional value in many of these companies.

NAV analysis

Mercia's total net assets amounted to £123.5m at FY18 vs £121.3m at FY17. This includes £49.4m unrestricted cash and £4.5m of goodwill, intangible assets and working capital. NAV per share at FY18 was 40.7p vs 40.4p in FY17. We note that the total £52.9m cash includes £3.5m restricted cash held on behalf of EIS investors.

Trading relative to NAV

As the listed IP commercialisation (IPC) sector has matured, the sector generally traded at a premium to NAV until late 2016 and, as indicated in Exhibit 25 below, Mercia's premium to NAV peaked in 2015 (at c 1.75x) with investors clearly anticipating healthy IRRs from the portfolio businesses.

Since 2017, however, the stock has fallen by c 40% and now trades at 0.73x NAV. If we account for a further 9p from the greatly expanded fund management business (see page 43), the discount would be 0.60x. See below for analysis on of the MFM value.

Exhibit 25: Share price performance compared to NAV


Source: Bloomberg, Edison Investment Research

Listed peers

Listed IPC companies are typically a UK phenomenon, having mostly invested in spinouts from British universities (with Allied Minds an exception to this rule, as it invests only from US institutions). Some of the listed IPC companies have listed spinouts within their portfolios, with unlisted holdings ranging from early-stage to unicorns. Following the acquisition of Fusion IP and Touchstone Innovations, IP Group is the largest IPC company with a portfolio of c 240 companies.

We show a comparative valuation on where each of these stocks trade versus their NAV in table 26. It is important to note that as a valuation measure, this is far from perfect – the companies have different structures and the calculation of NAV is not consistent. Ultimately companies who consistently demonstrate an ability to create value and generate successful exits will merit premium ratings while those who do not will merit discounts.

Mercia's stock trades at 0.73x NAV, which is considerably lower than many of its UK peers (IP Group at 0.78x, Draper Esprit at 1.68x, Syncona at 1.38x). We note that the US-focused Allied Minds trades at 0.47x NAV, having been affected by a series of portfolio business write-downs in 2017 and 2018.

For Mercia, given management's track record at successful exits, combined with a significantly lower-risk model vs its peers, we believe the sharp discount to NAV is unjustified. Catalysts for a re-rating include further externally-led funding rounds and/or successful exits, as well as concrete evidence of achieving operational milestones at subsidiary level. In our view, the greatest likelihood for a revaluation or exit currently lies in nDreams and Oxford Genetics.

Exhibit 26: Peer group comparison

	Price	Market Cap £m	NAV (last reported) £m	Cash £ m	NAV premium/discount
Allied Minds	61	147	316	50	0.47x
Arix Bioscience	176	238	258	137	0.92x
Draper Esprit	527	522	311	57	1.68x
IP Group	109	1159	1485*	259	0.78x
Mercia Technologies	30	91	124	49	0.73x
Syncona	286	1770	1283	68	1.38x
Average					0.99x

Source: Bloomberg; Edison Investment Research. Note: Priced at 16 October 2018. *IP Group's net assets, rather than 'Hard' NAV which excludes goodwill and intangible assets.

Sum-of-the-parts valuation: Assessing the value of MFM

It is important to note that the basic NAV calculation fails to include the contribution from the profitable £400m MFM business.

Excluding £1.2m of exceptional performance/ mandate success fees, Mercia's fund management business achieved revenues of £8.4m in FY18. In order to assess a valuation for MFM, we have estimated a FY19 net profit of c £2.7m and compared the EV/sales and P/E multiples to the asset management peer group. We summarise our assumptions here:

- We assume the funds are sticky, given the nature of the investors and assume similar revenues in FY19 (a total of £9m fund management revenues).
- Overall fund management fees of c 2%.
- Industry average profit margin of c 30% leads to net profit of c £2.7m.
- To establish a suitable multiple, we consider the consensus EV/sales and P/E multiples for a number of conventional asset managers in Europe. We have considered that a 15% discount to the peer group average would be reasonable, given the relative size and maturity of the MFM business relative to these listed peers. Our resulting EV/revenue and P/E multiples are 3.0x and 10.0x for MFM, leading to a blended total value of £27m, or 9p per share for the MFM business.
- We further note the implied discount is particularly appropriate given that our valuation has not incorporated the costs of running the corporate structure.

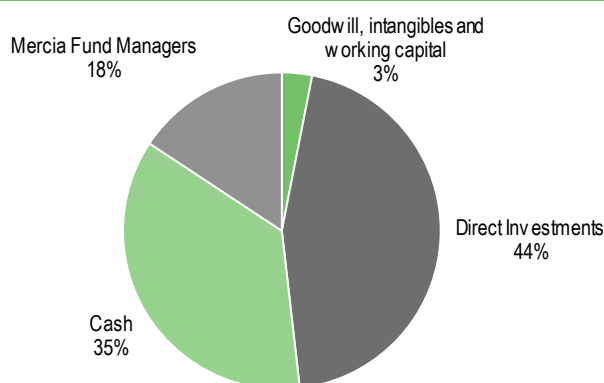
Exhibit 27: Asset manager peer group table

Company	Currency	Price (local)	Market cap (local)	P/E (current year, x)	EV/sales (current year, x)
Ashmore	£	3.44	2,456	14.7	5.9
Man Group	£	1.47	2,335	11.5	2.2
Azimut	€	12.24	1,752	11.9	2.7
Janus Henderson	\$	24.2	4,843	8.4	2.0
Jupiter	£	3.56	1,631	10.9	3.2
Schroders	£	29.13	7,923	13.0	4.3
Average				11.7	3.5
15% discount				10.0	3.0

Source: Bloomberg, priced at 11 October 2018

Altogether, therefore, our estimated sum-of-the parts valuation amounts to £150.5m, which is split between the portfolio assets (£66.1m), cash (£52.9m, including £3.5m restricted cash held for EIS investors), MFM (£27.0m) and goodwill, intangible assets and working capital (£4.5m).

Exhibit 28: Sum-of-the-parts valuation*



Source: Edison Investment Research

Financials

As with all VC groups, the financial statements are characterised by changes in fair value although in Mercia's case, the group also benefits from significant revenues from its fund management business.

Revenues: Predominately fund management fees

FY18 revenues increased by 53.1% to £10.2m, which includes fund management fees of £7.2m, initial management fees of £1.1m and portfolio director fees of £1.8m. The growth of FuM was a key driver in the increase in fund management fees (£7.2m vs £4.1m in FY17), but notably this also included exceptional performance fees of £1.2m.

We anticipate a similar revenue profile in FY19 since MFM won substantial mandates towards the end of FY18 and therefore we would expect fund management fees of c £9m in FY19. This is based on an overall fee of 2%.

Net expenses: £0.4m in FY18 vs £2.5m in FY17

As a direct result of increased revenues, net expenses (defined as revenue minus all staff and administrative expenses, including depreciation) in the year reduced from £2.5m to £0.4m. As noted above, the recurring revenue contribution from MFM is a key differentiator for Mercia, such that corporate operating costs are kept very low vs peers. We would anticipate a similar level of net expenses for FY19, before adding back the £1.2m of one-off revenues in FY18.

Cash: Significant cash balance to assist with future growth

Unrestricted cash and short-term liquidity investments (excluding cash held on behalf of third-party EIS investors) of £49.4m compares to £59.6m in the prior period. The decrease was due to accelerating direct investment of £21.1m, partially offset by the sale of Science Warehouse (£10.5m cash proceeds). This level of cash is expected to provide for two more years of direct balance sheet investment, even in the absence of further liquidity events.

Investments: £52.4m across the group

In FY18, Mercia invested £52.4m across the group, of which £21.1m was from the balance sheet. As shown in Exhibit 6 above, balance sheet investments were directed towards 14 existing businesses and the three new Emerging Stars. The group expects the number of Emerging Stars to increase over the next few years and therefore, from the c £60m investment anticipated for FY19, approximately £27m is likely to be invested into the balance sheet portfolio.

During FY18, an additional £160m was raised by portfolio companies in MFM through syndicated investment.

Other: Enterprise ventures

Mercia acquired Enterprise Ventures in March 2016 for a maximum consideration of £11m, expanding the group's regional presence and its investment capabilities. The initial consideration of £9.0m was settled with £8.3m cash and £0.7m shares. The deferred consideration was settled in full in FY18, through the issue of 2.7m new shares and the settlement of the vendor's tax liabilities, which resulted in an exceptional charge of £1.1m in both FY17 and FY18.

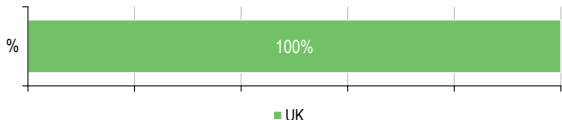
Sensitivities

- **Early-stage business risk:** Inherently, the early-stage nature of the portfolio businesses carries a high degree of risk and many of the fund investments are unlikely to reach their hoped for potential. Mercia estimates that three out of four companies in MFM will not achieve their initial aims. Given that only the most promising companies are migrated to the balance sheet, there have been no complete write-downs from the top 20 balance sheet investments. However, as shown above, it is likely that some companies (such as Science Warehouse in FY17 and Edge Case Games and Concepta in FY18) will be impaired at some point. Should there be a significant downward adjustment to fair value, this could have a negative impact on the share price.
- **Cash requirements:** A successful IP commercialisation company should have enough cash for new investments and be able to source matching investments from other institutions. We note that Mercia's current cash balance provides roughly two years of direct investment capital. Should there be no further liquidity events, the company may need to return to the market in about two years. As a positive, given the steady revenue stream from its MFM business, Mercia's operating costs have been almost fully offset (net expenses amounted to only £0.4m in FY18).
- **Lack of liquidity event:** Mercia Technologies has successfully exited from three investments, but liquidity events are difficult to predict and proceeds from trade sales/IPOs are likely to vary substantially from year to year.
- **Pipeline:** Mercia's direct investments are derived from its FuM, of which a proportion is held in tax-efficient EIS funds. Any change to tax relief legislation could have an impact on fund investors' decisions to invest and therefore could result in lowered FuM (and therefore a more limited pipeline and also lower group revenues). To counterbalance, we note that the group has a large variety of different funds, most of which are not reliant on tax incentives.
- **NAV calculations:** The inherent difficulty with the NAV is that it is often a reflection of the most recent transaction, rather than an audited figure or even an assessment of the underlying business model. We note that there is limited visibility regarding co-investment rounds for specific companies within the portfolio.

Exhibit 29: Financial summary

	£'k	2015	2016	2017	2018
31-March		IFRS	IFRS	IFRS	IFRS
INCOME STATEMENT					
Revenue		508	1,755	6,660	10,197
Cost of Sales		(10)	(79)	(92)	0
Gross Profit		498	1,676	6,568	10,197
Normalised operating profit		2,937	(1,439)	2,624	3,258
Amortisation of acquired intangibles		0	(17)	(301)	(301)
Fair value changes		3,934	896	4,268	2,823
Realised gains		0	0	839	871
Exceptionals		(1,018)	(372)	(1,125)	(1,125)
Share-based payments		(44)	(230)	(395)	(497)
Reported operating profit		1,875	(2,058)	803	1,335
Net Interest		93	361	186	274
Joint ventures & associates (post tax)		0	0	0	0
Profit Before Tax (norm)		3,030	(1,078)	2,810	3,532
Profit Before Tax (reported)		1,968	(1,697)	989	1,609
Reported tax		0	0	54	54
Profit After Tax (norm)		3,030	(1,078)	2,810	3,532
Profit After Tax (reported)		1,968	(1,697)	1,043	1,663
Discontinued operations		0	0	0	0
Net income (normalised)		3,030	(1,078)	2,810	3,532
Net income (reported)		1,968	(1,697)	1,043	1,663
Basic average number of shares outstanding (m)		212	212	224	301
EPS - basic normalised (p)		1.43	(0.51)	1.26	1.17
EPS - diluted normalised (p)		1.43	(0.51)	1.26	1.17
EPS - basic reported (p)		0.93	(0.80)	0.47	0.55
Dividend (p)		0.00	0.00	0.00	0.00
Revenue growth (%)		(-29.7)	245.5	279.5	53.1
Gross Margin (%)		98.0	95.5	98.6	100.0
Normalised Operating Margin		578.1	-82.0	39.4	32.0
BALANCE SHEET					
Fixed Assets		27,121	50,103	63,693	77,428
Intangible Assets		2,455	11,815	11,514	11,213
Tangible Assets		49	145	151	145
Investments & other		24,617	38,143	52,028	66,070
Current Assets		54,349	31,730	64,576	53,965
Stocks		0	0	0	0
Debtors		716	798	747	1,057
Cash & cash equivalents		23,633	20,932	28,829	42,908
Short term liquidity investments		30,000	10,000	35,000	10,000
Current Liabilities		(631)	(1,521)	(6,698)	(7,760)
Creditors		(631)	(1,521)	(6,698)	(7,760)
Tax and social security		0	0	0	0
Short term borrowings		0	0	0	0
Other		0	0	0	0
Long Term Liabilities		0	(271)	(217)	(163)
Long term borrowings		0	0	0	0
Other long term liabilities		0	(271)	(217)	(163)
Net Assets		80,839	80,041	121,354	123,470
Minority interests		0	0	0	0
Shareholders' equity		80,839	80,041	121,354	123,470
CASH FLOW					
Op Cash Flow before WC and tax		2,943	(1,406)	2,700	3,339
Working capital		(20)	650	5,250	(87)
Exceptional & other		(4,952)	(1,268)	(5,107)	(3,694)
Tax		0	0	0	0
Net operating cash flow		(2,029)	(2,024)	2,843	(442)
Capex		(27)	(113)	(82)	(75)
Acquisitions/disposals		(11,563)	(20,939)	(8,779)	(10,664)
Net interest		22	397	165	260
Equity financing		67,230	(22)	38,750	0
Dividends		0	0	0	0
Other		(30,000)	20,000	(25,000)	25,000
Net Cash Flow		23,633	(2,701)	7,897	14,079
Opening net debt/(cash)		(39)	(23,633)	(20,932)	(28,829)
FX		0	0	0	0
Other non-cash movements		(39)	0	0	0
Closing net debt/(cash)		(23,633)	(20,932)	(28,829)	(42,908)
Closing net debt/ (cash) inc short-term liquidity investments (but excluding restricted cash)		(53,633)	(30,932)	(59,601)	(49,435)

Source: Mercia Technologies and Edison Investment Research. Note. Normalised operating profit excludes share-based payments and amortisation of acquired intangibles.

Contact details	Revenue by geography
Forward House 17 High Street Henley-in-Arden UK 0330 223 1430 www.merciatech.co.uk	
Management team	
CEO: Dr Mark Payton Extensive venture investment experience and led the sale of Hybrid Systems to create PsiOxus Therapeutics, Warwick Effect Polymers to create Abzena and led the founding investment in Allinea Software. Leading role in Oxford University Innovation.	CFO: Martin Glanfield KPMG qualified chartered accountant with more than 20 years' experience as CFO of listed, private equity backed and privately owned technology led businesses.
CIO: Julian Viggers Joined Mercia through the 2016 acquisition of Enterprise Ventures, which he joined in 2004 and was head of technology investments. He has over 20 years of venture capital experience, including the successful listing of BluePrism and Xeros Technology Group.	Non-executive chair: Susan Searle Previously CEO of Imperial Innovations Group from 2002-2013, where she led funding rounds of c £250m. Prior roles at Montech (Australia), Signet Group, Bank of Nova Scotia and Shell Chemicals.
Principal shareholders	(%)
Invesco Perpetual	29.2
Woodford Investment Management	24.7
Forward Innovation Fund	11.1
Baillie Gifford	5.7
Forward Nominees	5.4
National Farmers Union Mutual	4.6
Companies named in this report	
Allied Minds, Arix Bioscience, Draper Esprit, IP Group, Syncona.	

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