

Clearthought

Aerospace Services

Driven by tourism, low air fares, higher living standards and a growing middle class, the global passenger market continues to soar.

Inside:

- Industry summary
- Leading players
- M&A activity
- Pattonair interview

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Market overview

Market growth

Despite a number of current headwinds, the long-term outlook for the aviation industry remains very strong. The International Air Transport Association (IATA) forecasts¹ that passenger numbers could double to 8.2 billion by 2037, with a CAGR of 3.5% over the next two decades.

Just as striking is what it calls the 'geographical reshuffling of world air traffic to the East' which is driving much of the continued growth. In particular, the Asia-Pacific region will account for more than half the total number of new passengers over the next 20 years thanks to robust economic growth, improvements in household incomes, and favourable population and demographic profiles.

China is set to displace the US as the world's largest aviation market by the mid-2020s,

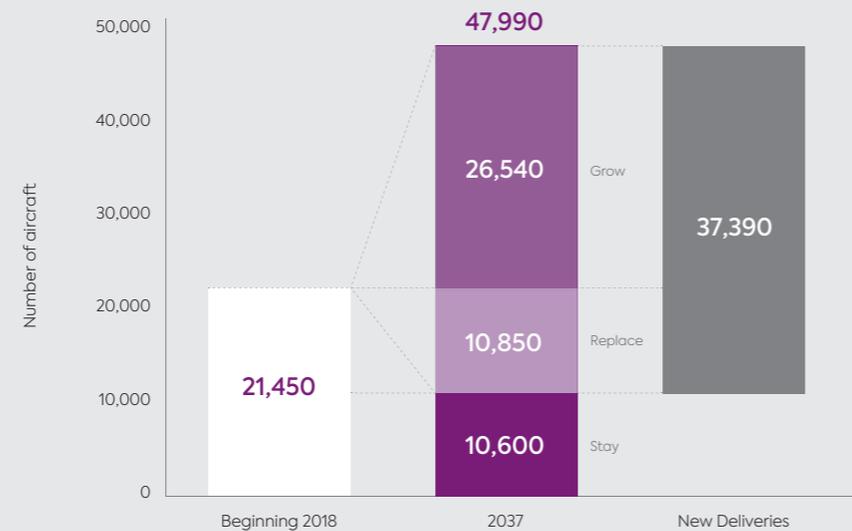
while India will become the third largest market. Growth in Indonesia is expected to also be particularly strong, with the country climbing from the world's tenth largest aviation market in 2017, to fourth by 2030. In total, routes to, from and within Asia-Pacific will see an extra 2.35 billion annual passengers by 2037, for a total market size of 3.9 billion passengers.

€771bn

of revenue forecast
by IATA for 2019

As the table (right) shows, in 2019 IATA is forecasting \$865bn (€771bn) of revenue in the global commercial airline market, a rise

Airbus Global Market Forecast 2018–2037



System-wide global commercial airlines	2013	2014	2015	2016	2017	2018	2019F
REVENUE \$ billion	720	767	721	709	755	812	865
% change	2.1	6.5	-6.1	-1.6	6.5	7.6	6.5
Passenger, \$ billion	537	538	509	498	534	561	589
Cargo, \$ billion	92.1	92.9	83.8	80.8	95.9	111.3	111.3
Traffic Volumes							
Passenger growth, rpk, %	5.7	6.0	7.4	7.4	8.1	7.4	5.0
Sched passenger numbers, millions	3,145	3,328	3,569	3,817	4,095	4,378	4,579
Cargo growth, ftk+mtk, %	1.8	5.8	2.3	3.6	9.7	3.4	0.0
Freight tonnes, millions	51.7	54.0	54.8	57.0	61.5	63.3	63.1
World economic growth, %	2.5	2.7	2.7	2.5	3.2	3.1	2.7
Passenger yield, %	-3.9	-5.4	-11.9	-8.8	-0.8	-2.1	0.0
Cargo yield, %	-4.8	-4.7	-11.9	-6.9	8.1	12.3	0.0

Source: IATA June 2019

of 6.5%, of which the passenger market will be worth \$589bn (€525bn), a rise of 5% on 2018.

New aircraft

Against this backdrop it is little wonder that the two industry giants, Boeing and Airbus, continue to announce ambitious growth plans. For instance, in summer 2019 Airbus revealed more than €8.9bn of aircraft orders and launched a new longer range version of its A321 which will fly transatlantic routes from 2023, while Boeing is also planning a new mid-market plane.

However, the IATA warns that should global protectionism continue to expand then growth will be slower. It recently downgraded its 2019 outlook for the global air transport industry to €25bn profit, down from a €31.5bn forecast, citing that the business environment for airlines has deteriorated with rising fuel prices and a substantial weakening of world trade.

The wider industry also continues to be affected by the fallout from the grounding of the Boeing 737 Max following two crashes, which will continue to have an impact on safety issues.

1: IATA 20-year air passenger forecast - update October 2018

Modernisation

The industry is ever more aware of the need for ongoing improvements in reducing the size, weight and power plus cost of planes, and the need to further drive its digital transformation.

The sector has one of the lowest innovation intensity percentages, but as new technologies such as robotics, autonomous systems, artificial intelligence, additive manufacturing and sensor technologies take hold, it will see an increased push towards the adoption of digital technologies.

Regional breakdown (number of aircraft)

	2018–2027	2028–2037	2018–2037	Share of 2018–2037 New Deliveries
Africa	450	680	1,130	3%
Asia Pacific	6,480	9,160	15,640	42%
CIS	580	640	1,220	3%
Europe	3,650	3,420	7,070	19%
Latin America	1,330	1,380	2,710	7%
Middle East	1,340	1,490	2,830	8%
North America	2,970	2,990	5,960	16%
Freighters	450	380	830	2%
World Total	17,250	20,140	37,390	100%

Source: Airbus Global Market Forecast 2018–2037

The demand for more fuel-efficient aircraft, along with the need to bring down both acquisition and total ownership costs, will further drive demand for electric aircraft. Expect increasing regulation in this area too. For instance, the EU's Flightpath 2050 programme calls for a 75% reduction in carbon emissions per passenger kilometre by 2050, compared with 2000 levels.

One voice

Although an all-electric aircraft is still many years away from scaled production due to challenges in power density, efficiency, safety and regulation, several leading industry players are now working on plans to bring electrically powered aircraft to the market.

What is striking is how the industry is now speaking as one with regards to the challenge of climate change. In an unprecedented show of unity, at the 2019 Paris Air Show industry giants pledged to halve 2005-level carbon dioxide emissions by 2050, and to limit the growth of net CO₂ emissions by 2020. They also agreed to join forces to support the development of biofuels, slash emissions and create cleaner engines, planes and new technologies.

Sector breakdown



Engines

The aero engine value chain comprises of material suppliers, engine components suppliers and engine sub-system providers, all of whom specialise in different modules and technologies.

Given that the market is highly demanding regarding technology expertise, and that the development of new engines and engine parts requires substantial upfront investments, the engine industry is characterised by limited competition with high barriers to entry. Suppliers along the aero engine value chain also have to commit to long-term contracts with OEMs.

Industry 4.0 provides huge potential for production process optimisation, while intelligent machine control and optimisation of material flow are transforming the production of aero engine components and systems. The increasing use of composite materials in aircraft is also driving the rising use of sensors in planes, as damage to composite materials is harder to spot.

Additive manufacturing

Additive manufacturing brings potentially huge benefits for the industry in terms of the production of lightweight parts with complex geometries and stationary turbine components. It also has the potential to shorten the development process and time to market, as well as giving suppliers the freedom to design complex geometries which maximise performance, consolidate design, and improve reliability – thereby helping to achieve lighter weight aircraft and improved fuel efficiency.

Most analysts believe that smaller passenger aircraft driven by propellers will be among the first to convert to electric propulsion.

Electric future

As seen in the automotive market, there is now great debate about the potential of electrification to transform the industry, and the extent to which hybrid

solutions could be increasingly employed in the short to medium-term as battery technologies are developed.

Most analysts believe that smaller passenger aircraft driven by propellers will be among the first to convert to electric propulsion. For instance earlier this year Harbour Air, North America's largest seaplane airline, announced a partnership with magniX to transform its seaplanes into an all-electric commercial fleet.

Israeli start-up Eviation is also developing a nine-seater electric aircraft called Alice, which is designed to fly up to 650 miles, while Airbus is working with Rolls-Royce and Siemens to electrify a 100-seater regional aircraft called the BAe146.

The rush to go electric is also driving M&A activity. Rolls-Royce recently agreed to acquire Siemens' electric and hybrid-electric aerospace propulsion business in order to accelerate its electrification strategy.

Aerostructures

With fuel accounting for almost a quarter of airlines' operating expenses, manufacturers are experimenting with a vast range of new products in order to make aircraft ever stronger and more efficient.

For example, the airframe of the Airbus A350 is now 53% composite, making it 25% more fuel efficient, while Boeing's Dreamliner is 50% composite and around 20% more efficient.

Both companies are at the forefront of innovation and unearthing new methods of production. For instance Airbus is working with German biotech company AMSilk on using artificial spider silk to create a new generation of composite material that could revolutionise aerospace design. AMSilk is the world's first industrial supplier of synthetic silk biopolymers.

Airbus is also working on its Breakthrough Laminar Aircraft Demonstrator in Europe (BLADE) project which is exploring the use of Natural Laminar Flow (NLF) technologies for smart wings which do not have any joints or rivets. NLF wings can potentially help reduce drag and therefore cut fuel consumption.

Boeing is working on the Transonic Truss-Braced Wing which, likewise, is designed to be more aerodynamic and fuel efficient. The higher wingspan is made possible by a truss which supports the extended length of the ultra-thin wing.

Electronics

The ongoing investigation into the Boeing 737 Max aircraft shows how electronic systems, and particularly the use of more automated systems in aircraft, will become ever more important, especially as debate continues over how deeply automation and artificial intelligence should take hold across the industry.

Two years ago Airbus launched Skywise, an open data platform of reference used by major aviation players to improve operational performance, ensuring complete data continuity with benefits across the entire value chain.

With fuel accounting for almost a quarter of airlines' operating expenses, manufacturers are experimenting with a vast range of new products in order to make aircraft ever stronger and more efficient.

More than 80 airlines have now connected their Airbus and non-Airbus fleet to Skywise, which provides all users with one single access point to their aggregated and anonymised aviation data gained from multiple sources across the industry into one secure, cloud-based platform.

The platform allows automated reporting, benchmarking capacity, and access to applications, thereby improving airlines' operations and reducing their costs. The

more data that airlines or OEMs share via the Skywise Core platform, the more accurate the predictions and models are for connected customers.

Airbus says that by making the right information available at the right time, Skywise provides invaluable insights from the massive amounts of data that was previously locked in corporate and functional silos.

MRO market

The Maintenance, Repair and Overhaul (MRO) market is growing fast with total MRO spending forecast¹ to rise to \$114.7bn (€102bn) by 2028 at a CAGR of 4%. Growth will average 3.5% from 2018 to 2023, and then 4.5% between 2023 and 2028.

The report says some of the fastest growth is projected for MRO operations owned by aircraft manufacturers and other major original equipment manufacturers. Boeing, for instance, has set a €44.6bn goal for its aftermarket services as part of its effort to capture more life-cycle value out of its aircraft. OEMs servicing engines handle more than half of the market, while airlines and their affiliated MRO operations control almost two thirds of the airframe maintenance market.

An exciting driver of the MRO market is the increasing amount of sensors and technology that is installed within today's engines, which brings huge potential to use generated data within the aftermarket as recorded data which can be used to optimise fuel consumption, engine lifetime, and reduce maintenance costs.

1: Oliver Wyman – Global fleet and MRO market forecast commentary 2018–2028

M&A activity

The aerospace industry continues to be a rich seam of M&A activity.

The current level of consolidation is reaching a 30-year peak with the cycle fuelled by rising cost pressures, the need

to access new technologies and proof of concepts, and because of emerging global opportunities.

Some of the most recent transactions are among the largest deals seen

anywhere in 2019. For instance in June, United Technologies Corp and Raytheon agreed to an all-share merger which creates a broad aerospace and defence supplier with current sales of €66bn.

Defence Electronics

Date	Acquirer	Acquirer Country	Target	Target Country	Target Description	EV Em	EV/Sales	EV/EBITDA
29/5/19	Harris Corporation (NYSE:HRS)	US	Exelis Inc.	US	Exelis Inc. provides command, control, communications, computers, intelligence, and surveillance and reconnaissance (C4ISR) electronics and systems	3,100.12	1.5x	9.3x
14/3/19	TransDigm Group Incorporated (NYSE:TDG)	US	Esterline Technologies Corporation	US	Esterline Technologies Corporation provides avionics, sensor and other electronic systems	3,026.81	2.0x	13.0x
4/3/19	Cerberus Capital Management, L.P.	US	Sparton Corporation	US	Sparton Corporation provides design, development, and manufacturing services for electromechanical devices, and engineered products in electromechanical value stream	201.73	0.7x	9.1x
26/11/18	United Technologies Corporation (NYSE:UTX)	US	Collins Aerospace	US	Collins Aerospace provides aviation technology systems	23,439.21	5.0x	14.0x
29/2/16	J.F. Lehman and Company, LLC	US	API Technologies Corp.	US	API Technologies Corp., together with its subsidiaries, designs, develops, and manufactures systems, subsystems, modules, and components for radio frequency (RF) microwave, millimeterwave, electromagnetic, power, and security applications	220.09	1.3x	13.5x

Aerostructures

18/4/19	Vision Technologies Aerospace Incorporated	US	MRA Systems, LLC	US	US-based original equipment manufacturer of aerostructures and nacelle systems for commercial and military aircraft	481.909	1.2x	10.0x
26/4/18	Melrose Plc	UK	GKN Plc	UK	UK-based engineering group providing airframe structures, including wings, fuselages, empennages, and nacelles and pylons	23,439.21	5.0x	14.0x
19/1/18	TowerBrook Capital Partners L.P.; Torreal, S.A.; Peninsula Capital S.a.R.L.	UK	Aernnova Aerospace S.A. (70.6% Stake)	Spain	Spain-based company that manufactures and designs aero structures	1,115.46	1.8x	10.6x
8/4/16	Albany International Corp.	US	Albany Aerostructures Composites LLC	US	US-based aerostructures business of Harris Corporation	151.45	2.7x	n.a.
6/11/15	Lockheed Martin Corporation	US	Sikorsky Aircraft Corporation	US	US-based company engaged in the design, manufacture and service of military and commercial helicopters; fixed-wing aircraft; spare parts and maintenance, repair and overhaul services for helicopters and fixed-wing aircraft; and civil helicopter operations	5,919.949	1.4x	14.0x

MRO

10/1/2019	VSE Corporation	US	1st Choice Aerospace Inc.	US	US-based aircraft component maintenance, repair and overhaul (MRO) company	119.1	3.2x	n.a.
3/11/2017	StandardAero Aviation Holdings, Inc.	US	Vector Aerospace Corporation	Canada	Canada-based provider of aviation repair and overhaul services	560.9	1.0x	n.a.
5/2/2016	BBA Aviation Plc	UK	Landmark Aviation	US	US-based company that operates a network of fixed base operations and provides maintenance, repair and overhaul services	1,336.4	2.8x	12.4x
8/7/2015	The Veritas Capital Fund V, L.P.	US	StandardAero Holdings, Inc.	Canada	US-based company engaged in providing maintenance repair and overhaul (MRO) services to aircrafts	1,454.0	n.a.	12.5x
15/5/2015	Magellan Aerospace Corporation	Canada	Euravia Engineering & Supply Co. Ltd.	UK	UK-based aviation company that provides maintenance, repair and overhaul (MRO) solutions for a wide range of aircraft and helicopter gas turbine engines	22.0	1.6x	6.2x



Aero Engines

Date	Acquirer	Acquirer Country	Target	Target Country	Target Description	EV Em	EV/Sales	EV/EBITDA
27/05/2016	Silverfleet Capital	UK	Sigma Precision Components	UK	UK-based manufacturer of precision components and assemblies for aero engines. Products include ducting and complex pipe assemblies, fasteners, and machined components	65.0	n.a.	n.a.
12/1/2016	HEICO Electronic Technologies Corp.	US	Robertson Fuel Systems, LLC	US	US-based designer, developer and manufacturer of auxiliary fuel systems for aircrafts	171.2	n.a.	n.a.
21/11/2015	Meggitt Plc	UK	Cobham (advanced composites businesses)	UK	UK-based business of Cobham engaged in design, development and production of engineered aerospace composite engine components	129.2	2.5x	10.0x
20/11/2014	Arconic Inc.	US	Firth Rixson Limited	UK	UK-based company that manufactures and markets rings, forgings, and other engine components to original equipment manufacturers in aerospace	1,673.1	2.9x	n.a.
6/6/2013	TransDigm Group Inc.	US	Arkwin Industries Inc.	US	US-based company engaged in designing and manufacturing of hydraulic and fuel system components for civil and military fixed-wing aircrafts, helicopters, spacecrafts, turbine engines and special applications	187.6	3.0x	n.a.

Landing Gear

1/10/2018	Heroux-Devtek, Inc.	Canada	Compania Espanola de Sistemas Aeronauticos, S.A.	Spain	Spain-based company that develops and manufactures landing systems and components	120.9	1.4x	10.0x
30/10/2015	Precision Castparts Corp.	US	Noranco Inc.	Canada	Canada-based manufacturer and supplier of complex machined and fabricated components for landing gear	361.2	n.a.	10.0x
28/10/2015	GKN Plc	UK	Fokker Technologies Group B.V.	Netherlands	Netherlands-based company which designs, develops, and manufactures landing gear components	502.0	0.8x	8.4x
27/6/2014	Triumph Group, Inc.	US	GE Aviation (Hydraulic Actuation Business)	US	US-based hydraulic actuation business of GE Aviation which provides hydraulic landing gear	41.9	n.a.	n.a.
3/2/2014	Heroux-Devtek, Inc.	Canada	APPH Limited; APPH Wichita, Inc.	US USA	UK-based designer and manufacturer of hydraulic systems and landing gears for commercial and military aircraft US-based designer, developer, tester, and repairer of hydraulic systems and landing gears for general aviation and business aircraft markets	76.0	1.6x	10.0x

Aircraft Components

26/10/2018	Spirit Aerosystems Holdings Inc	US	ASCO Industries nv/sa	Belgium	Belgium-based developer and manufacturer of aerospace products and aeroplane components	480.8	1.5x	c.8.0x
27/6/2017	Sonaca S.A.	Belgium	LMI Aerospace, Inc.	US	US-based supplier of components to the aerospace and technology industries	343.9	1.2x	12.5x
12/6/2017	Shaanxi Ligeance Mineral Resources Co., Ltd.	China	Gardner Aerospace Holdings Limited	UK	UK-based manufacturer of metallic aerospace detailed parts	356.8	2.7x	14.2x
29/1/2016	Berkshire Hathaway Inc.	US	Precision Castparts Corp.	US	US-based manufacturer of metal components and products providing investment castings, forgings and fasteners, fastener systems for critical aerospace and industrial gas turbine (IGT) applications	23,597.6	3.7x	12.5x
24/4/2015	RBC Bearings Inc.	US	Sargent Aerospace & Defense Inc.	US	US-based manufacturer of specialised aircraft components	335.9	2.6x	n.a.

Rising to the challenge

Pattonair has become a major global supplier of small and medium value components to the aerospace industry. CEO Wayne Hollinshead charts the company's rise.

Despite an impressive roll-call of customers ranging from Rolls-Royce, United Technologies and GE, through to Boeing and Airbus, UK aero parts distributor Pattonair is a company which has kept rather under the radar.

However it is a business without which the industry wouldn't function. Whether it's fasteners, seals and clamps, or bearings, the company has been distributing the 'nuts and bolts' to leading aerospace players for almost half a century.

It is, however, a company which has caught the eye of investors over the past decade, especially since it was spun out of listed aerospace group Umeco in 2011. Little surprise either, given that Pattonair has enjoyed 20% growth year on year for the last five years, with growth evenly split between existing and new customers, and driven by both the continued rise in the global air fleet and strong MRO market.

Innovative

CEO Wayne Hollinshead says the roots of Pattonair's current success lay further back in the late 1990s when it made a proposal to Rolls-Royce to start managing its supply chain for small parts. "Such a move now would be regarded as commonplace, but at the time this was a really innovative step to take and it was one of the projects that really attracted me to join the company in the first place in 2000. Subsequently we were able to learn from the experience of that

contract and use it to good effect with other clients."

Over the following decade under Umeco's ownership, the business went on a major acquisition spree, initially across Europe and then further afield to the US, and opening new businesses in Singapore and China. "In order to scale up the business we recognised that we had to be a global company and be winning customers in new regions. If you have no presence on the ground in a country, it is very difficult to run operations in that country. To be a European brand we had to acquire companies across Europe, while to be taken seriously as a global player we needed a presence in the US and Asia."

When Umeco subsequently put Pattonair up for sale to focus on its composites business, Hollinshead led a buy-out backed by Exponent Private Equity.

He says the vision behind the deal was to create "one truly global business" and one of the key moves was to bring everyone in the business together into one central global IT platform. "That also meant we could move staff around between different countries," he adds. "We spent a lot of time on people and culture, and on employee engagement, creating a global family feel. Rather than us all celebrating our own small successes in each different country, we wanted to be celebrating all our successes across the globe."

Transformation

Having been at the sharp end of the industry for almost 20 years, Hollinshead is well-placed to comment on the huge changes now sweeping the industry.



"To be a European brand we had to acquire companies across Europe, while to be taken seriously as a global player we needed a presence in the US and Asia."

He says the most significant change has been the consolidation and "professionalisation" of the supply chain. "It's also become truly global. We had to respond to that consolidation by creating a central function ourselves."

Constantly improving its digital offer has been fundamental to the growth story, and he sees huge potential from Industry 4.0, machine learning, increased automation, and the development of blockchain systems.

"We are delving hard into that right now, working with our key partners and evaluating exactly what it means to us while taking a measured approach. How can we use technology to collaborate quicker and faster with our customers and further integrate our systems? How can we get better information to help us make better decisions? How can we improve our forecasting and inventory to improve our service levels? There are also potentially huge benefits in terms of improving traceability and approval systems too."

He also sees a crucial role for a player like Pattonair in terms of educating SMEs and helping them make the transition to 4.0 technologies. "We can help them on that journey, but with the natural caveat that we will only work with chosen suppliers who are happy to integrate with our systems. I can see this trend happening right across the industry as larger players help SMEs understand the benefits that new technologies can bring."

Electrification

Hollinshead is naturally keeping a close eye on developments elsewhere across the industry, not least the move towards electrification. "In 10 to 15 years you could,

for instance, definitely see electric business jets in operation, and in the medium-term I can see a huge push to electric. No-one knows exactly what the future of the industry will look like, but what is absolutely certain is that it will look very different in 50 years' time to today."

As it continues to grow its operations further across Europe, the Far East, and North and South America, the future is sure to look different for Pattonair too. Two years ago the business was acquired in a secondary buy-out by Platinum Equity. In August it was announced that the US fasteners and machined parts provider Wesco had been acquired and will now be merged with Pattonair in a deal which further strengthens its global credentials. Pattonair also recently acquired UK aircraft spares company Adams Aviation.



"No-one knows exactly what the future of the industry will look like, but what is absolutely certain is that it will look very different in 50 years' time to today."

Our recent aerospace transactions

We have advised leading players across the industry for many years on their strategic options and M&A activity, building up long-lasting and deep-rooted connections with management teams across this diverse sector.

The strength of these personal relationships ensures that when the time is right, we are brought on board to help these businesses broaden their horizons globally and exploit new markets, geographies and technologies.

 <p>sold to</p> <p>Morvern Group</p> <p>Sell-side Undisclosed</p>	 <p>sold to</p> <p>RG Industries LLP</p> <p>Sell-side Undisclosed</p>	 <p>sold to</p>  <p>Sell-side Undisclosed</p>
 <p>sold to</p> <p>MEGGITT</p> <p>Sell-side Undisclosed</p>	 <p>sold</p> <p>AC&S to studec</p> <p>Sell-side Undisclosed</p>	 <p>joint venture with</p> <p>Harbin Guanglian Aeronautic Composite Materials</p> <p>Sell-side Undisclosed</p>
 <p>sold</p> <p>its three trading subsidiaries to</p>  <p>Sell-side Undisclosed</p>	<p>AIRI SRL</p> <p>sold</p>  <p>to</p>  <p>Sell-side Undisclosed</p>	 <p>raised debt finance from</p>  <p>Financing Undisclosed</p>

Our international industrials team

With offices in Europe, the US and Asia, our industrials team can deliver seamless, integrated global advice to SME/owner-managed, corporate and private equity clients. Our team is supported by a number of high-profile senior advisers who are all former top tier executives with relevant product knowledge and a far-reaching network of contacts.

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