

2024 EDITION

The New Era of Aviation and Aerospace

Project Directors: Libby Jennings, Alfred Yeranossian

Written by: Michaila Byrne

Everyone loves a good comeback story, and judging by the record number of passengers (and profits) forecasted by the International Air Transport Association (IATA) for 2024, aerospace is back in business, and possibly bigger than ever.

You'd be hard-pressed to name an industry more adversely impacted by the Covid pandemic. Not in recent collective memory — with the possible exception of the tragic attacks on September 11, 2001 — has aerospace felt reverberations on such a colossal scale. Between grounded fleets, an immobilized workforce, and a global pause on production, the sector was brought to a screeching halt while a grave question mark hung over its future.

But thanks to the rising social mobility of the middle classes, a cultural and consumer phenomenon dubbed “revenge travel” emerged, and by almost all accounts, it's here to stay. Radical technological innovations promise to transform the future of flight, and with the

cost of launching assets into outer space sitting at an all-time low, the sky is no longer the limit.

However, as airports, airlines and original equipment manufacturers (OEMs) ramp up capacity and production targets to unprecedented levels, they face the daunting task of juggling supply chain delays and incessant labor shortages. Beyond that are more existential fears and legitimate doubts that loom and linger in the public's mind. Tales of cost-cutting companies prioritizing profits at the expense of safety are making headlines, ongoing geopolitical disputes are disrupting run-of-the-mill trade routes, and protest movements are placing increased pressure on this fossil-fueled industry to reach net-zero carbon emissions — and fast.

Can resources and regulations keep pace with the demand? We interviewed approximately 100 executives across the value chain to find out.

2024
RECORD FORECAST

 **5B**
travelers

 **\$30.5B**
net profits

 **62M**
tonnes of air cargo volume

Source: International Air Transport Association (IATA)



BENOÎT SCHULTZ | CEO, **AIRBUS CANADA**

Our primary goal remains to earn the right to continue connecting people and enabling them to travel from point A to point B; to achieve this, we must decarbonize aviation. This task is our fourth revolution, following the previous challenges of flying the first aircraft, achieving safety and enabling mass air travel.



MIKE WHITAKER | ADMINISTRATOR, **FAA**

The FAA's critical role in maintaining aviation safety is more important than ever as we navigate unprecedented changes in our national aerospace system. We're embracing innovation while remaining laser-focused on ensuring our system remains the safest in world transportation history.



ÉRIC MARTEL | PRESIDENT & CEO, **BOMBARDIER**

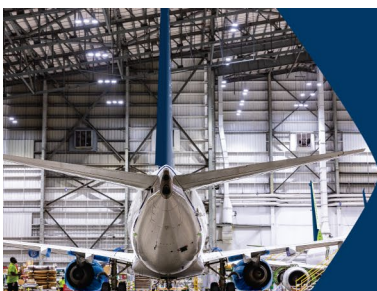
Our flight test team conducted tests as part of the introduction of new models like the Global 8000 - the world's fastest business jet ever conceived with a top speed of Mach 0.94.



MARC PARENT | PRESIDENT & CEO, **CAE**

Our latest generation of visuals offers near-perfect visual acuity. Simulators are on jacks to mimic real flight movements, including acceleration, turbulence and other cues; alarms and sounds are exactly what pilots hear in real aircraft.

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**JOHN MARIS | CEO,
MARINVENT COOPERATION**



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A Year of Scandal and Safety

A report on aerospace in 2024 would be incomplete without delving into the question of safety. In the wake of one of the biggest industry scandals in history — where two brand-new Boeing Max 737 planes were lost in almost identical accidents that led to 346 people losing their lives — a blame game ensued. Now former CEO Dave Calhoun was publicly grilled in Congress and an intensive FAA investigation into compliance issues is ongoing. Amid high-profile headlines and a harsh spotlight cast on the entire sector, we ask: Is this a classic case of safety being compromised in pursuit of profit? Or is there more to the story?

“When something high-profile goes wrong, there tends to be a sense of hysteria and heightened scrutiny, but it doesn’t mean that the thing that started it all wasn’t real. Aerospace is not amenable to cost-cutting and there’s been a trend where accountants overrule technical specialists. The consequences don’t necessarily manifest right away, but catch up with you in the end,” John Maris, president and CEO of Marinvent, tells us. He adds that testing real-world scenarios and considering factors like aircrew fatigue and stress should be a priority. “As a certification test pilot, one is essentially being paid to tell someone that their baby is ugly; that it may cost billions of dollars to fix; and that the product will probably be delivered late, which upsets the company and its customers.”

He argues that failures appearing technical in nature or the result of a pilot error can have managerial and process issues as their root causes. Aviation is extremely complex, so accidents are inevitable to a certain extent. However, unlike driving cars, extensive precautions are standard protocol; pilots and air traffic controllers undergo regular medical checks, the weather is continually monitored, and even airlines with the worst safety records are still safer than riding a motorcycle.

Boeing has been the top dog for decades. Still, some OEMs speculate that this precarious moment in the company’s history could induce



FLORIAN GUILLERMET | EXECUTIVE DIRECTOR, EUROPEAN UNION AVIATION SAFETY AGENCY (EASA)

The EU has established bilateral safety agreements with prominent countries in civil aviation: the U.S., Canada, Brazil, China, Japan and the UK.



BRIAN MORAN | CHIEF SUSTAINABILITY OFFICER, BOEING

SAF can reduce lifecycle carbon emissions by up to 84 percent, offering the largest potential to reduce carbon emissions over the next 30 years.

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We've partnered with Airbus and ZeroAvia to study the planning, infrastructure, and distribution needs for hydrogen at major airports like YVR. This will explore the potential for hydrogen fuel in aviation, and support a two-way flow of information.

**TAMARA VROOMAN |
PRESIDENT AND CEO,
VANCOUVER
INTERNATIONAL AIRPORT**



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Aerospace in Canada

is the region's largest export sector



200k
workers employed



\$27B
contribution to
Canada's economy



\$1.2B
of investment
into R&D

Source: The Aerospace Industries Association of Canada (2023 figures)

changes — but could the Airbus-Boeing duopoly be under real threat? Arjan Meijer, president and CEO of Embraer, comments: “There’s a lot of discomfort and uncertainty with the Airbus-Boeing duopoly, and airlines are considering how the market will develop.” As company losses mount following mass strike action, the OEM has even confirmed it will be axing a tenth of its workforce (approximately 17,000 people).

In the meantime, the FAA hopes to provide reassurances, mandating Boeing develop a comprehensive action plan to address its quality control and production issues. They told us: “A dedicated team of FAA subject matter experts is constantly reviewing Boeing’s progress. Senior FAA leaders meet weekly with Boeing to monitor performance, and monthly reviews are conducted to ensure that they’re on track with the necessary improvements.” We also reached out to Boeing for comment; they confirmed the implementation of a comprehensive plan to strengthen its safety management, quality assurance and safety culture: “We’re fully committed to this plan and to continuous improvement, which has helped make commercial aviation the safest mode of transportation, and will work under the FAA’s oversight and uphold our responsibility to the flying public to continue delivering safe, high-quality aeroplanes.”

The events of the past 12 months have been a sobering reminder of the importance of regulation, especially as production targets ramp up. “Regulation is the gatekeeper for public safety. Without it, operators could cut corners, risking public safety and the industry’s survival. We’ve seen from time to time that complacency in aircraft maintenance and regulation has led to safety issues and lapses. Even if high demand could be a contributing factor, it should never be an excuse for cutting corners,” says Jeffrey Lam, president of Commercial Aerospace, ST Engineering.

A Case Study: The Canadian Cluster

The world’s most dynamic and established “big three” aerospace clusters — locations where a plane can be built from tip to tail — are undisputed. While Seattle, Washington, (U.S.) and Toulouse (France) have been in contention for the crown for over 40 years, it’s the third-place spot that stands out for its unique profile.

A curious case study, unlike its rivals that are largely famous due to a singular name association, the Quebec region is distinctive due to its hosting of five OEMs: Airbus with the A220, Bombardier with private jets, Bell Helicopter, engine manufacturer Pratt & Whitney, and simulation manufacturer CAE.

Marsha Walden, president and CEO of Destination Canada explains that restoring air access and routes through international airline partnerships was central to the country’s Covid recovery strategy. We also hear from Laurel Broten, CEO of Invest in Canada, who mentions that the region is offering incentives to allow write-offs for machinery and equipment, as well as tax incentives: “With federal investments of \$350 million for sustainable aviation technology,

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MÉLANIE LUSSIER | CEO, AÉRO MONTRÉAL

The five prime contractors or OEMs don't compete directly but complement each other in different niches, which makes our cluster unique.



**DENIS GIANGI | PRESIDENT,
ROLLS-ROYCE CANADA**


Montreal has great universities and trade schools, but there's a spike in demand across all businesses. We're all competing for the same resources.

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TONY HEMMELGARN | PRESIDENT & CEO, SIEMENS DIGITAL INDUSTRIES SOFTWARE

By designing with 3D printing, we've reduced the weight of an end effector by 70 pounds.



MARCO TRONCONE | CEO, AEROPORTI DI ROMA

We're phasing out our fossil-based generation plant in favor of photovoltaic generation, aiming to release over 60MW of photovoltaic power within the airport boundaries.



WARWICK BRADY | PRESIDENT & CEO, SWISSPORT INTERNATIONAL AG


The price of electric equipment is decreasing, and they are cheaper to operate, but infrastructure at airports is the main hurdle.



STUART PARKER | VP & GENERAL MANAGER AEROSPACE BUSINESS, SENSATA TECHNOLOGIES

The shift to electric has been gradual over the past 20 to 30 years, however, in the last three to four, there's been more focus on propulsion system alternatives.

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R&D incentives like \$500 million in clean fuel compliance payment revenues, and extensive free trade agreements, Canada is positioned well for global companies seeking sustainable solutions.”

Additionally, the costs of domestic travel are unaffordable for everyday Canadians and driving long distances to avoid paying allegedly exorbitant ticket prices is becoming increasingly commonplace, something Eric Tanner, vice president of revenue management for ultra- low-cost carrier Flair Airlines, attributes to a “flawed” user-pay model for airports and lack of oversight on airport fees. “The regulations, policy, infrastructure, and costs are built around the legacy business models of Air Canada and WestJet, making it difficult to maintain low fares due to high airport fees and taxes. For example, one airport increased its improvement fee from \$15 to \$25 overnight. There’s no accountability, and airlines have no choice but to pay these fees, which are passed on to customers.”

It Ain't Easy Being Green

As waves of coordinated climate protests spread across the globe, what might have once been dismissed as mere militant outrage from a few fanatic activists gluing themselves onto runways has matured into a societal shift genuinely moving the needle and shaping political agendas everywhere.

A small minority of the people we spoke to bristled at aviation’s “bad guy” image, quickly pointing out that contrary to popular belief, aviation “only” accounts for 2.5 percent of global carbon emissions. That may well be the case, and while the 2.5 percent figure is correct, it doesn’t quite paint the whole picture given that the European Commission (EC) had this figure at 2 percent only two years ago.

The EC also notes that aviation generates 13.9 percent of all transport emissions, making it the second-largest source of greenhouse gas emissions in the transport sector. To complicate matters, if the current trajectory continues to snowball, carbon emissions from commercial flights could triple by 2050.

All eyes are up and firmly fixed on aerospace; with demand skyrocketing, OEMs will be working tirelessly to balance meeting demand with sustainability commitments. In line with its order book, Airbus Canada confirms its intention to double the A220 model output to 14 aircraft per month by 2026. This sentiment was echoed by Zean Nielsen, CEO Cirrus: “We have a one-to-one book-to-build ratio, with a backlog of about 1,000 SR Series aircraft and 250 Vision Jet orders. We’re not constrained by demand but by our production capacity.”

The most transformative technologies are within grasp, but as things stand, are too expensive and still in their infancy. Aviation’s sincerity in its desire to phase out fossil fuels might not be in question, but its means might be. Multiple avenues including electric, hydrogen, and alternative fuels will require significant support and investment.

Will SAF Save the Day?

One “drop-in” technology touted to slash emissions is SAF — an alternative to jet fuel made from non-petroleum feedstocks, hydrocarbons, and residues such as recycled cooking oil, animal fat waste, and even human excrement.

OEMs and engine manufacturers are designing the next generation of products to accommodate. The International Airlines Group claims to be on track to deliver a 100-fold increase in SAF volumes between 2022 and 2030 as well as use SAF for 70 percent of total fuel by 2050. Last year, Virgin Atlantic flew the world’s first 100 percent SAF flight from London to New York, and Kenya Airways became the first African airline to use SAF on an international flight.



TODD BORGMANN | CEO,
CALUMET

Frankly, we don't think of others as competitors. The biggest risk is insufficient capacity to accommodate the demand growth.



STEVE CSONKA | EXECUTIVE DIRECTOR,
**COMMERCIAL AVIATION ALTERNATIVE
FUELS INITIATIVE**

This year, aviation will likely exceed 100 billion gallons of jet fuel; SAF will account for less than 1 percent and is currently 1.5 to 2 times more expensive.



PABLO RODRIGUEZ |
MINISTER OF TRANSPORT, **CANADA**

Our target is to have 10 percent SAF usage by 2030, which will help mitigate the impact of volatile fuel prices and drive us toward our net-zero future.

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As part of its carbon offset program, Sentient Jet aims: “for a 300 percent offset to cover aerosols, water vapours, and other environmental impacts from flights,” Andrew Collins, co-CEO says. However, scarcity and sheer cost remain barriers to widespread adoption: “SAF is currently 3 times more expensive and infrastructure still needs to be developed, yet I’m optimistic. Similar to how the cost of solar panels dramatically decreased over a decade due to scaling, I expect SAF to follow a similar trajectory as demand increases and production scales up,” says Alexandre Feray, Founder & CEO, OpenAirlines.

Nathaniel Pieper, CEO of airline alliance oneworld, adds: “While the airline industry is often criticized for its emissions, we’ve moved past a victim mindset. Most major airlines are setting challenging, but ambitious sustainability goals like SAF adoption.” However, as Todd Borgmann, CEO, Calumet points out: “Balancing economic factors is crucial—we can’t create more problems by making energy unaffordable. The U.S. government’s Grand Challenge aims for 3 billion gallons by 2030 and IATA has said that 60 percent of airline fuel needs to be sustainable by 2050, but right now, we’re at less than 0.1 percent.”

Even traditional petroleum fuel companies like Shell are getting in on the action by diversifying their offerings. According to Meijer, who recently announced Embraer’s collaborations with Avfuel and Brazilian energy company Raizen — Brazil could be well-positioned to become a major producer: “Brazil is the most developed country in terms of ethanol use for cars, a very green energy source. We aim to reduce aircraft fuel burn, with our E2s achieving up to a 30 percent reduction, and promote SAF to achieve net zero by 2050.”

While Canada holds a global reputation for its production and use of renewable green technologies, it’s been surprisingly slow on the SAF uptake. “The issue lies in the willingness to invest. If more stakeholders, including governments and oil companies, focused on increasing SAF production, we could see substantial emission reductions,” Éric Martel, president & CEO of Bombardier, tells us. Benoît Schultz, CEO of Airbus Canada, echoes: “Canada has the industry, technologies, and natural resources like biomass and green hydrogen to produce SAF, but it lacks a clear direction. Institutions and authorities are not yet clear on the most promising direction.”

The EU has mandated blending targets of 6 percent SAF by 2030 and 20 percent by 2035 with penalties for non-compliance and in the US, the Inflation Reduction Act provides financial incentives for production. Encouraging producers to maximize SAF yields over other renewable fuels like diesel is shifting the economics. Industry voices call for more support, but quantifying the exact needs remains murky territory.

CONTENT BY INVESTMENT REPORTS



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PHILIP HOARE | COO, **ATKINSRÉALIS**

The eVTOL space is evolving rapidly. Companies that can secure financial backing, along with credible partners and supply chains, will likely survive.



KYLE CLARK | FOUNDER & CEO, **BETA TECHNOLOGIES**

Each flight costs \$15-\$17 to charge with electricity. A gas or diesel-powered plane costs \$600-\$700 for the same mission, 40 times the energy cost.



ADAM GOLDSTEIN | FOUNDER & CEO, **ARCHER AVIATION**

Typical missions will be around 25 miles; the 17-mile trip from Manhattan to JFK can take 90 minutes by car but only five minutes by air.



GUNNAR KLEVELAND | PRESIDENT & CEO, **ALBANY INTERNATIONAL**

eVTOL companies are more receptive to innovative solutions like 3D woven composites, which is why we've made quicker progress with them.

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Traffic in the Sky

Picture this scene: You open your Uber-like app, and a small electric aircraft drops from the sky to transport you to your destination. Welcome to the world of advanced air mobility — aka, air taxis. Following in the footsteps of the electrification of the automotive industry, we are told this fictional scenario once relegated to the Back to the Future films could become commonplace by the 2030s. Two years ago, a wealth of funding was injected into electric take-off and landing vehicles (eVTOLs), with thousands of companies flooding the market. But R&D isn't cheap; these pioneering players burn through cash quickly, and all are now chasing certification. The competition is stiff, so when the gold rush inevitably comes to an end, who will be the last eVTOL standing?

Electric aviation in its current iteration isn't suited for every mission, but it's ideal for those under 500 miles and in cities troubled by pollution and congestion, promising increased safety, reduced noise, and significantly lowered cost. Thanks to advancements pushed by Tesla, electric power systems have advanced to the point where lithium-ion batteries have enough energy and power density to power an aircraft, with prototypes for larger models expected by the end of this decade.

The first step will be proving safety credentials to regulatory authorities, next will be winning over the hearts and minds of local communities. Joby Aviation has set its sights on Dubai and New York as early launch markets. As for noise concerns, CEO Joe Ben Bevirt claims that its aircraft measures about 65 decibels in hover and 45 decibels in overflight, as opposed to helicopters which typically sit between 85-95 decibels. By 2040, electric aircraft could carry up to 200 people and with continuous evolution, they could capture a larger market share over time. eVTOLs seeking urban deployment must also factor in additional real estate costs such as roof permits and the lack of an established network of available landing sites. Klaus Roewe, CEO of Lilium explains: "We believe less in the urban market than our competitors. The regional market is more lucrative, less regulated, faster to access, easier to establish and connect longer distances." He adds that engagement from EASA is more advanced than the FAA, which is "lagging 2-3 years behind."

Even CAE has commenced the development of eVTOL simulators and training programs for these aircraft and major OEMs have caught wind of the trend. Throwing its hat into the ring developing a five-person 100 percent electric helicopter-style aircraft through its subsidiary company Eve Air Mobility is Embraer while Boeing's subsidiary Wisk Aero is developing an unmanned, self-flying aircraft.

“Materials science is where the future lies. “Our strength in advanced materials gives us a significant edge, particularly as the aviation industry focuses on fuel efficiency and reducing aircraft weight. By using 3D woven technology, we can make planes lighter without sacrificing strength,” CEO of Albany International Gunnar Kleveland says.

Short-haul vs Long-haul

If you’ve ever been stranded in a remote location with limited flight options or having to board a seemingly wasteful connecting flight, you’ll be familiar with the frustrations of regional air travel.

However, regional connectivity plays a profound role in bridging otherwise inaccessible communities and enabling the economic development of underserved regions. Air Inuit for example is the sole operator transporting both passengers and cargo to and from the northernmost communities of southern Quebec as well as Nunavik’s 14 coastal villages. “We remain committed to our mission of providing essential services, serving the Inuit people, and maintaining the lifeline that it represents,” Christian Busch, CEO, says.

The trouble is jet engines are optimized for cruising at high altitudes, not for the frequent takeoffs, landings, and ground taxiing that short-haul flights require. Jet engines are also costly and wear out similarly, whether used on short or long flights. This inefficiency for short-haul travel poses a real dilemma catch-22 for those looking to decarbonize.

With its flagship project the ES-30, Swedish startup Heart Aerospace is developing an electric aircraft specifically for regional travel, aiming to achieve certification by 2028. According to Anders Forslund, co-founder & CEO, “A 200-kilometer flight emits twice as much fuel per kilometer as a 1,000-kilometer flight.”

Given the high demand, Embraer plans to consolidate its core market segment of up to 150 seats while studying electric, hybrid, and hydrogen options under the Energia project aircraft family. In 2022, ATR, which claims to be the lowest-emission regional aircraft on the market, delivered a new engine which they report has resulted in the ATR 72-600 emitting 45 percent less CO2 per trip than a regional jet of a similar size. “On the CO2 emissions side, on a typical regional route of 250 to 300 nautical miles, ATRs only emit 69 grams of CO2 per seat and per kilometer, less than a hybrid car,” CEO Nathalie Tarnaud Laude says. But the demand for models capable of longer distances without stops isn’t going anywhere. Jeff Lake, CEO of Duncan Aviation, says, “Our business has shifted from predominantly small Cessnas and Learjets to larger Falcon, Bombardier, and Gulfstream aircraft, leading to increased demand for ultra-large aircraft.” AAR is also expanding its wide-body aircraft capabilities for the 787 and A350, particularly in Europe and Asia.

John M. Holmes, president and CEO, AAR adds: “The democratization of flight and rising incomes across Asia have driven significant growth not just in MRO services, but also in our parts supply business. As airlines in these regions mature, they become more open to lower-cost aftermarket solutions, especially given the ongoing OEM supply chain challenges.”



REED MACDONALD | CEO, MAGNIX
The primary challenge to electrifying short-haul flights has been sufficient energy density in batteries, which is why we’re developing our own battery.



TOM O’LEARY | CO-FOUNDER, JETZERO
There’s still demand for middle market 200 to 250-seater jets. Any airline looking to lower its fuel burn would be interested in our aircraft.

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Companies and individuals looking to purchase their first business aircraft would benefit from partnering with an experienced advisor who knows the jet market and has first-hand experience in the successful, long-term operation of business aircraft.

JEFF LAKE | PRESIDENT & CEO, DUNCAN AVIATION



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Global World (Dis)Order?

Between the war in Ukraine, the crisis in the Middle East, and ongoing conflicts in Africa, geopolitical tensions are disrupting trade and traveler routes and shaking up supply chains globally.

The International Civil Aviation Organization (ICAO) plays a critical role in addressing risks and issuing guidance for operations over or near conflict zones so States can better perform risk assessments. According to ICAO’s president, Salvatore Sciacchitano, the invasion of Ukraine presents “one of the greatest challenges ever to confront modern international order, serving as a lesson that the incredible benefits and progress realized through international frameworks and agreements can be quite fragile and our multilateral systems and objectives must be continuously renewed and reinforced.”

The knock-on impact is being acutely felt by both airlines and companies producing essential specialty materials. “We can’t fly over Russia, making flights two to three hours longer and more costly,” Marjan Rintel, CEO of KLM Royal Dutch Airlines explains. Kimberly Fields, president of ATI Inc.,



**ANDREW COLLINS | CO-CEO,
FLEXJET, SENTIENT JET'S PARENT COMPANY**
The perception of reduced health risks and exposure compared to commercial flights led many to explore private aviation for the first time.



**JEROME DE CHASSEY | PRESIDENT,
SMITHS DETECTION**
We typically look for dangerous goods, narcotics, arms, and other evolving threats. Each new technology brings added capabilities.



**HENRY HERNANDEZ | PRESIDENT & CEO,
INTER-CON SECURITY**
Clients understand the increased demand for security during election years and are prioritizing proper staffing and technology to maintain airport security.



**PETER NILSSON | PRESIDENT & CEO,
TRELLEBORG**
We're easily looking at 50 percent growth in the next few years so we are setting up in Morocco, expanding to China, and looking at SouthEast Asia.



**MARSHA WALDEN | PRESIDENT & CEO,
DESTINATION CANADA**
The unique aspect of Canadian cities is that you're never far from nature. This proximity has staying power and is especially attractive for business events.

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points to critical disruptions namely in titanium due to restrictions on Russian materials: "We saw a rapid shift in titanium sourcing for aerospace, which created significant demand and highlighted the importance of diversifying our customer base."

Routes are also being diversified in response; Vancouver International Airport has added 13 new markets — including Vietnam and Indonesia — to compensate for lost routes: "Before the pandemic, YVR had more flights to and from China than any other North American airport. However, diplomatic tensions and geopolitical changes have reduced these significantly. Commercial aviation is governed by nation-to-nation treaties, and changes like this have resulted in stricter adherence to governing protocols, limiting the number of reciprocal flights," Tamara Vrooman, CEO, explains. As for security threats, Henry Hernandez, president & CEO of Inter-Con Security highlights: "Externally, large military conflicts and aggressive actions by countries like Russia, China, and Iran pose cyber risks. Our main fear is state-funded cyberattacks targeting airport operations, such as air traffic control systems." With U.S. election season also upon us, he adds that domestically there is "significant fear of potential incidents of domestic disturbances, especially at major airports."

Calling All Pilots and Engineers: We Need You!

Aging demographics and a shrinking working population are causing headaches for all industries, and aviation is no exception; labor shortages are nothing short of severe and compounding by the year.

Boeing's "Pilot Technician Outlook" estimates that North America alone will require 127,000 new pilots by 2042. Reports of airlines being forced to ground aircraft due to a shortage of cockpit crew are becoming more commonplace, which is extremely costly. Suzanne Benoit, president & CEO of the Quebec Air Transport Association (AQTA), says, "The shortfall of pilots in North America is expected to remain at significant levels over at least the next 10 years." We are told by some carriers that they have resorted to lobbying governments for more flexible permits for foreign workers and even considering hiring retirees to plug the gap.

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LARRY CLUPHF | EXECUTIVE DIRECTOR, THE WASHINGTON AEROSPACE TRAINING & RESEARCH (WATR) CENTER

There's a huge demand for engineers and assemblers, including assembly mechanics, electrical assembly, composite wings, and tooling.



DAVID ALEXANDER | DIRECTOR, RICE SPACE INSTITUTE

The expansion of the space industry requires a diverse workforce, from degree-level engineers to skilled technicians.



MARCO SMIT | CEO, NAYAK AIRCRAFT SERVICES

Like many other MROs, the biggest challenge for us is manpower since our main asset is skilled employees.

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According to Marc Parent, CEO of CAE, half of the pilots flying in 10 years haven't begun training yet. However, he is confident that advances in the quality and realism of its simulators could expedite the time it takes to qualify. "With a high demand for pilots, we use data to accelerate their training and ensure they reach required standards faster. We prepare pilots for critical scenarios they might never see in their careers."

Specialist mechanics and aeronautical engineers are also in short supply; aside from being poached by higher-paying countries, companies are fighting over talent. As one of the most labor-intensive subsectors, the global MRO market is expected to grow more than 33 percent between 2023 and 2033; those we spoke to unanimously cited the workforce as their greatest concern.

The Air and Beyond

More often than not, when a news alert about space pops up on your phone, it's in the sporting sense; the Bezos and Bransons of this world "going on a jolly" — at least on the surface. However, in large part thanks to the trailblazing work of SpaceX, the cost of launching assets is at an all-time low, bringing the space economy to "an inflexion point" in its history.

No longer a playground reserved only for billionaires or governmental agencies, commercial space flight and exploration are more accessible than ever. In this final section, we highlight use cases where companies are pushing the boundaries of innovation for the benefit of the rest of us here on Earth.

Planet Labs' satellites are assessing crop performance and helping governments assess flood, fire and earthquake damage. Recent applications include coordination with the Red Cross for rescue and relief efforts during Hawaii's Lahaina fire and assisting the Brazilian Federal Police in combatting illegal deforestation in the Amazon. In Quebec, MDA



With venture capital investment doubling annually and a 2.5x economic multiplier, space is a high-performing industrial sector. This is why countries are actively building space programs and fostering the creation of new space companies worldwide.

MIKE GREENLEY | CEO, MDA SPACE



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Space is similarly developing radar-based satellites with the ability to monitor ice movements and ocean health and track illegal fishing and immigration. Space-based communications satellites can provide global broadband and direct-to-device for even the most isolated. And of course, there's the possibility of ultimately living and working in space. But with outer space still relatively uncharted territory, fears of a lawless Wild West situation persist. Regulation is still playing catch-up, so scrappy newcomers must proceed with caution to proactively ensure ethical, responsible practices and minimize "space junk."



MATTHEW KUTA | CO-FOUNDER & PRESIDENT, VOYAGER SPACE

We've reached an inflection point. In our lifetime, we'll likely see the number of people who have flown into space increase from hundreds to thousands.



SASSIE DUGGLEBY | CO-FOUNDER & CEO, VENUS AEROSPACE

We're commercializing the world's most efficient rocket engine, which can make San Francisco to Tokyo possible in under an hour.



STÉPHANE ISRAËL | CEO, ARIANESPACE

Ariane 6 is designed with a zero-debris approach; we will de-orbit the upper stage after the mission, ensuring we don't leave any objects in space.



ZACHARY KREAVOR | PRESIDENT & CEO, STRATOLAUNCH SYSTEMS

We're a decade away from hypersonic business jets; it takes around five to seven years to complete certification. The timeline is realistic but ambitious.



DAN GOLDBERG | PRESIDENT & CEO, TELESAT

Demand for in-flight internet connectivity has become one of the few ways airlines can differentiate themselves.

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